FINAL

FIELD ASSESSMENT REPORT

on

ECOLOGICAL SAMPLING ACTIVITIES

at the

U. S. DEPARTMENT OF ENERGY

ROCKY FLATS PLANT

Golden, Colorado

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ACRONYMS

ASME	American Society of Mechanical Engineers
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CMS	Corrective Measures Study
DCN	Document Change Notice
DOE	U.S. Department of Energy
DQOs	Data Quality Objectives
EEWP	Environmental Evaluation Work Plan
EG&G	Name of Contractor Company
EM	Environmental Restoration and Waste Management
EMAD	Environmental Monitoring and Assessment Division
EMD	Environmental Management Department
EPA	Environmental Protection Agency
ER	Environmental Restoration
FS	Feasibility Study
FSP	Field Sampling Plan
HAZWRAP	Hazardous Waste Remedial Action Program
HSP	Health and Safety Plan
IAG	Interagency Agreement
NQA	Nuclear Quality Assurance
OSHA	Occupational, Safety, and Health Act
OU	Operable Unit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
QA	Quality Assurance
QAA	Quality Assurance Addendum
QAMS	Quality Assurance Management Staff
QAP	Quality Assurance Program
QAPjP	Quality Assurance Project Plan
QC	Quality Control

RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SOP	Standard Operating Procedures
SOPA	Standard Operating Procedures Addendum
WP	Work Plan

1.0 INTRODUCTION

One of the most important responsibilities of the U.S. Department of Energy (DOE), Office of Environmental Restoration is to develop, implement, and maintain an effective Quality Assurance Program (QAP) for all Environmental Restoration (ER) activities, including quality assessment of contractor activities. This QAP is based on DOE requirements and procedures, applicable requirements of DOE Orders, as well as ASME NQA-1 (ASME, 1989) and EPA/QAMS/005/80 (EPA, 1980) quality standards. The goal of the QAP is to ensure that ER programs generate data and information of known and sufficient quality to support remedial decision-making at acceptable levels of confidence and power. The QAP is being developed and implemented by: (1) adopting appropriate policies, requirements, and guidance; (2) providing guidance to DOE Field Offices and ER sites; and (3) conducting periodic audits and assessments of selected activities that are of particular importance to ER programs.

In keeping with the responsibilities of the QAP, the Office of Environmental Restoration (EM-453) has tasked the Hazardous Waste Remedial Action Program (HAZWRAP) to conduct an independent assessment and evaluation of the ecological field sampling activities being carried out by the DOE contractor at the Rocky Flats Plant (RFP). The primary objectives of the ecological field sampling assessment task were to assess:

- the adherence of field data collection activities to applicable guidance, procedures, work plans, sampling plans, quality assurance/quality control (QA/QC) requirements and recommendations, and health and safety guidelines;
- the impact of these field activities on attainment of data quality objectives (DQOs); and
- the implementation of corrective actions taken as a result of recommendations proposed during prior assessments.

The ecological field sampling assessment task began with preliminary scoping in May 1992 and culminated in the completion of this report. Following scoping and prior to on-site activities, the assessment team identified and reviewed relevant documentation to determine requirements and guidance and reviewed surveillance checklists specific to each ecological data type to guide and document the assessment activities. The on-site assessment of ecological sampling teams at the RFP was conducted June 29 - July 1, 1992 and July 14 - 16, 1992. The affiliations, roles, and names of the key personnel associated with the ecological field sampling assessment task were:

DOE RFP	Bruce Thatcher
DOE RFP ER Manager:	Frazier Lockhart
DOE HQ (EM-453)	
HAZWRAP Project Manager:	Bob Magee
ER	
HAZWRAP Surveillance Team:	James Otten, Allin Stephens and John Martinson

The remainder of this report is organized into five sections and includes two attachments. The methodology and scope of the ecological field sampling assessment task are discussed in Section 2.0, the results including findings, observations and recommendations are discussed in Section 3.0, impact of field activities on the attainment of data quality objectives is discussed in Section 4.0, and the references cited are listed in Section 5.0. Attachments A and B present the SOP for conducting the ecological field sampling assessment task and the completed field assessment checklists for the sampling activities observed during the on-site assessment, respectively.

2.0 METHODOLOGY

The ecological field sampling assessment task was conducted in the following phases: (I) Task Planning, (II) Pre-assessment Preparation, (III) On-site Field Assessment, and (IV) Assessment Evaluation. The activities included in each phase are summarized below.

2.1 PHASE I - TASK PLANNING

The planning phase began with the review of *Procedures for Conducting Field Surveillance of Ecological Sampling at the U. S. Department of Energy Rocky Flats Plant* and *Final Field Surveillance Report on Ecological Sampling Activities at the U. S. Department of Energy Rocky Flats Plant (March 6, 1992)* resulting from the field assessment conducted October 1 - 3, 1992. These documents were consulted to identify required assessment activities and to determine the specific past findings which should have resulted in the implementation of a corrective action. The supporting information and documentation needed to conduct the field assessment task were identified. This included site and OU-specific information such as the quality assurance project plan and addenda, standard operating procedures, environmental evaluation work plans, field sampling plans, health and safety plans, and ecological sampling schedules.

2.2 PHASE II - PRE-ASSESSMENT PREPARATION

Pre-assessment preparation included: (1) the determination of the existence of revised SOPs relevant to environmental evaluation sampling; (2) the review of surveillance checklists specific to each ecological data type; and (3) the scheduling of on-site assessment activities.

Relevant portions of the supporting documentation (Table 1) were reviewed to: (1) determine the applicable requirements and guidance for the ecological sampling activities; and (2) identify major deficiencies in the supporting documentation as compared to regulatory guidance and quality standards. The documentation reviews were primarily conducted to support the implementation of the on-site assessment, and did not constitute rigorous evaluations of the technical adequacy of each document. The regulatory guidance and quality standards that were used for comparison with the supporting documentation are listed in Table 2.

Table 1. Rocky Flats Plant Documents Prepared by EG&G that Were Consulted during the Ecological Field Sampling Assessment Task.

Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities (May, 1991)

Rocky Flats Plant Final Work Plan RFI/RI Work Plan for OU3, U. S. Department of Energy, Rocky Flats Plant (December, 1991)

Quality Assurance Addendum QAA 3.1 to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities for Operable Unit No. 3, Land Surface, Great Western Reservoir, Standley Lake and Mower Reservoir (no date)

EMAD Operating Procedures, Manual No. 5-21200-OPS-EE, Volume V: Ecology (August, 1991)

EMD Operating Procedures, Manual No. 5-21200-OPS-FO, Volume I: Field Operations (October, 1991)

EMD Operating Procedures, Manual No. 5-21200-OPS-SW, Volume IV: Surface Water (September, 1991)

Rocky Flats Plant, Environmental Restoration Health and Safety Program Plan (October 1990)

Table 2. Regulatory and Independent Guidance Documents Consulted in the Ecological Field Assessment Task.

American Society of Mechanical Engineers (ASME), 1989. *Quality Assurance Program Requirements for Nuclear Facilities.* ASME NQA-1-1989 Edition and Addenda.

Environmental Protection Agency (EPA) 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans.* Office of Monitoring Systems and Quality Assurance, Office of Research and Development, EPA/QAMS-005/80.

Environmental Protection Agency (EPA) 1987. *Data Quality Objectives for Remedial Response Activities: Development Process.* Office of Emergency and Remedial Response. EPA/540/G-87/003.

Environmental Protection Agency (EPA) 1987. *Data Quality Objectives for Remedial Response Activities, Example Scenario: RI/FS Activities at a Site with Contaminated Soil and Ground Water.* Office of Emergency and Remedial Response. EPA/540/G-87/004.

Environmental Protection Agency (EPA) 1987. *A Compendium of Superfund Field Operations Methods. Office of Emergency and Remedial Response.* EPA/540/P-87/001.

Environmental Protection Agency (EPA) 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA.* Interim Final. Office of Emergency and Remedial Response. EPA/540/G-89/004.

Environmental Protection Agency (EPA) 1989. *Report on Minimum Criteria to Assure Data Quality.* EPA/530-SW-90-021.

Environmental Protection Agency (EPA) 1989. *Risk Assessment Guidance for Superfund: Volume II. Environmental Evaluation Manual.* Office of Solid Waste and Emergency and Remedial Response. EPA/540/1-89/001.

Environmental Protection Agency (EPA) 1989. *Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference.* Environmental Research Laboratory. EPA/600/3-89/013.

Environmental Protection Agency (EPA) 1990. *Guidance for Data Useability in Risk Assessment. Interim Final.* Office of Emergency and Remedial Response, EPA/540/G-90/008.

The surveillance SOP (Attachment 1) describes the purpose, scope, requirements, responsibilities, and assessment instructions. The surveillance checklists specific to each data type were designed to guide, assist, and document the field assessment efforts, and to facilitate the summarization of results.

In order to make the most effective use of the time available for on-site activities, the field assessment was scheduled to allow the observation of a broad range of ecological sampling activities. During the period of time selected for the implementation of the on-site assessment, ecological sampling activities were scheduled for OU 3. A summary of the field sampling activities evaluated on-site including assessment dates, sampling locations, data types, sampling personnel, and assessors is presented in Table 3.

2.3 PHASE III - FIELD ASSESSMENT IMPLEMENTATION

Phase III included the implementation of the independent assessment conducted during two site visits (June 29 - July 1, 1992 and July 14 - 16, 1992). The on-site activities included a preassessment meeting with EG&G personnel to establish lines of communication and schedule and coordinate on-site assessment activities.

The field activities associated with sample collection for the following data types were observed and evaluated:

Terrestrial Vegetation:	two point-intercept transects two belt transects one production plot sample
Birds:	one quantitative songbird survey on one sample plot one qualitative songbird survey
Benthic Macroinvertebrates:	sediment sampling from one aquatic sampling station water quality measurements at three sampling stations
Fish:	electrofishing sampling from two aquatic sampling stations
Small Mammals:	100 traps located on four sampling stations

In addition, the assessment team evaluated the effectiveness of any corrective actions implemented from recommendations in *Final Field Surveillance Report on Ecological Sampling Activities at the U. S. Department of Energy Rocky Flats Plant (March 6, 1992)* resulting from the assessment conducted October 1 - 3, 1991. Observation of other activities critical to data useability (laboratory analyses, sample storage and archival, shipping and handling, sample

Table 3. Summary of Field Assessment of Ecological Sampling at the Rocky Flats Plant OU3.

Date	Location	Data Type	Sampling Activities Observed	Personnel	Contractor	Assessor(s)
6/29/92	Operable Unit 3	Terrestrial Vegetation	Point-Intercept Transects Belt Transects	Sam Bamberg Ingrid Hanne Tamar Ares Carolyn O'Hare	RA Consultants RA Consultants CH2M Hill CH2M Hill	J. Otten A. Stephens J. Martinson
6/30/92	Operable Unit 3	Terrestrial Vegetation	Point-Intercept Transects Belt Transects	Sam Bamberg Ingrid Hanne Tamar Ares Carolyn O'Hare	RA Consultants RA Consultants CH2M Hill CH2M Hill	A. Stephens
6/30/92	Operable Unit 3	Birds	Quantitative Songbird Survey and Qualitative Songbird Survey	Jill Stoecker	Stoecker Ecological Consultants	J. Otten J. Martinson
7/14/92	Operable Unit 3	Benthic Macro-invertebrates	Water Quality Paramenter and Surveys of Ponds or Other Standing Water	Mike Mischuk Karmen Klima	CH2M Hill CH2M Hill	A. Stephens J. Martinson
7/14/92	Operable Unit 3	Fish	Electrofishing, Handling of Samples, and Water Quality Parameters	Richard Moos Mike Mischuk Karmen Klima Robert Shelden	CH2M Hill CH2M Hill CH2M Hill CH2M Hill	A. Stephens J. Martinson
7/15/92	Operable Unit 3	Small Mammals	Checking Traps, Weighing, Inspecting, and Marking Animals, Baiting and Setting the Traps	Bob Stoecker Jill Stoecker	Stoecker Ecological Consultants	A. Stephens J. Martinson
7/15/92	Operable Unit 3	Terrestrial Vegetation	Production Plots	Sam Bamberg Ingrid Hanne Tamar Ares Carolyn O'Hare	RA Consultants RA Consultants CH2M Hill CH2M Hill	A. Stephens J. Martinson

tracking and chain of custody, and data management) was beyond the scope of the field assessment.

Phase III activities culminated in the preliminary evaluation of the field checklists and a presentation of the preliminary results to DOE/RFP ER and/or EG&G staff at post-assessment meetings.

2.4 PHASE IV - ASSESSMENT EVALUATION

Phase IV included: (1) the detailed evaluation of the results of the on-site assessment; (2) the further review of supporting documentation for adherence to applicable requirements and guidance; (3) an evaluation of the impact of ecological sampling activities on the attainment of DQOs; and (4) preparation of the draft and final field assessment reports.

The detailed evaluation of the sampling activities was conducted by comparing the ecological sampling activities documented on the checklists to the applicable requirements and guidance, and categorizing all departures as findings or observations. Findings and observations are defined as follows:

Finding - identification of a clear violation of a specific requirement or guidance that potentially or actually results in collection of ecological data of unacceptable or indeterminate quality.

Observation - identification of a discrepancy between field activities and specific requirements or guidance that, in and of itself, would not result in ecological data of unacceptable or indeterminate quality, however, a number of observations for the same activity or related activities could result in the determination of a finding.

Recommendations for corrective actions were made for each finding and observation. Additional recommendations for improving the ecological sampling activities and supporting documentation were also made.

DQOs are qualitative and quantitative statements specified to ensure that data of known and sufficient quality are obtained in the field sampling effort. Development of data quality objectives (DQOs) is the central focus of the EPA QAMS guidelines. Virtually all QA/QC activities not related to occupational health and safety considerations are conducted to assure achievement of DQOs.

DQOs are generally defined in terms of the five PARCC parameters (i.e., Precision, Accuracy, Representativeness, Completeness, and Comparability). According to the Quality Assurance Project Plan (QAPjP), the specific objectives associated with each of these parameters are dependent on the intended uses of the data, and should be described in the WP/QAA prior

to initiating any sampling or analysis activities. These five parameters and their relationship to assessment of ecological sampling efforts are defined as follows:

Precision of an environmental measurement process is a measure of mutual agreement among individual measurements of the same parameter, usually under prescribed similar conditions. Precision is usually expressed in terms of the standard deviation of an individual observation or the standard error of the mean. Precision (or lack thereof) is determined by random errors that can be introduced into the measurement process in the field during sample collection, handling, transportation, and preparation (for shipment to the laboratory). In the laboratory, random errors can be introduced during subsampling of the field sample, while preparing the subsample for analysis, during the analysis itself, and in the data management process. In most cases, the major source of random error affecting precision is the inherent spatial variability in the parameter (field variability), which can be measured through the use of QA/QC samples. Duplicates (i.e., collocated field samples) can be used to estimate total measurement error, while replicates (preparation splits of a single field sample) can be used to estimate measurement error contributed during all subsequent stages of the measurement process. For some biological parameters where subsampling (i.e., sample splitting) is not possible (i.e., benthic macroinvertebrate sampling), estimating field (i.e., real world) variability independently from the other sources of random error that effect precision cannot be accomplished. An estimate of precision is generally needed to design a quantitative sampling program (i.e., one that will produce data needed for hypothesis testing and quantitative decision-making). The field assessment effort will contribute to an evaluation of the adequate estimation and attainment of acceptable levels of precision by evaluating the adequacy of duplicate and replicate samples and by identifying inconsistent application of the sampling protocol (i.e., SOP).

Accuracy is a measure of the agreement of a measurement (or the mean of several measurements of the same parameter), with an accepted reference or true value. Since the "true" value of an environmental parameter is never known, accuracy itself cannot be assessed, and is, therefore, expressed in terms of bias. Bias results from systematic errors that can accumulate during a measurement process due to inappropriate sampling design, sampling procedure, analytic procedure, contamination, losses, deterioration, and inaccurate instrument calibrations. In sampling environmental media for contaminant burdens, bias is usually estimated or detected with various QC samples, such as blanks and spikes. This approach is largely inapplicable to sampling for biotic parameters. The field assessment effort will contribute to an evaluation of the attainment of accuracy through a review of the sampling design and by identifying systematic errors introduced during sample collection from consistent misapplication of the protocol (SOP) or application of an SOP that is not appropriate for the particular site-specific situation.

Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness can be influenced

by both the design of the sampling program and its implementation. In particular, representativeness is dependent on selection of a sampling methodology that generates estimates of population means and variances that are representative of the true parameter values. According to the QAPjP, options chosen for sampling and analysis must be specifically described somewhere in the WP, preferably in the FSP. In the ecological assessment effort, representativeness is assessed by evaluating the sampling design, the methodology for selection of sampling locations, and the random and systematic errors introduced into the process of sample collection and field preparation which adversely affect precision and accuracy, particularly the use and selection of sampling tools.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. Goals for completeness at RFP are specified in the Field Sampling Plan/QAA. Collection of samples identified as "critical" must be 100% complete. If sampling is substantially incomplete, particularly with regard to critical samples, representativeness could be severely impacted. Completeness can be compromised in a field effort by not attempting to collect (i.e., overlooking) designated samples, unsuccessful collecting of designated samples, and by the eventual rejection of samples due to evidence of the presence of significant systematic or random errors. Attainment of completeness is highly dependent on the availability of a well-documented field sampling plan that clearly lays out the information to be collected in the field program. During the preparation for the on-site assessment, the SOPs and documentation for the field effort are evaluated to identify potential sources of error that could ultimately lead to failure to collect some samples. The on-site assessment identifies sources of systematic and random errors which could potentially lead to the rejection of some or all of the samples and insufficient completeness.

Comparability is a measure of the confidence with which one data set can be compared to another. Comparability is best accomplished by adherence to the same SOPs across studies, wherever appropriate, and by development of SOPAs, as needed to address site-specific conditions. A field assessment activity can assess comparability by evaluating the consistency in the degree of adherence to a particular SOP across OUs. This would be particularly important in cases where different field teams are employed in the collection of these data. Comparability can also be assessed by evaluating the appropriateness of the SOP to the range of conditions found across the various OUs, and the adequacy of the SOPA in addressing these site-specific differences.

The product of a field QA/QC assessment effort is an evaluation of the degree to which the sampling data contribute to meeting OU-specific DQOs.

It is important to recognize that the design and implementation of a field effort are just two of several components of the environmental measurement process for restoration activities at RFP. Total error in the measurement process is the sum of the random and systematic errors associated with design, field, laboratory, and data management activities. In order to effectively

evaluate attainment of DQOs, periodic audits and assessments of a wide range of activities are needed during the entire course of the environmental measurement process.

3.0 RESULTS

3.1 OVERVIEW

The field assessment teams received excellent cooperation from DOE/RFP ER, EG&G, and the subcontractors (Table 3) during the on-site activities. EG&G staff facilitated access to supporting documentation and field sampling personnel were helpful in scheduling on-site assessment activities and providing necessary equipment.

The academic training and professional field experience of the leaders of field sampling work crews exceeded the minimum requirements of the SOPs. Individual work crew members with less than two years field experience were under the direct supervision of the work crew leader at all times. One individual performing field sampling activities, during the June 29 - July 1, 1992 assessment, did not have the required hazardous waste site safety and health training required by the Superfund Amendments and Reauthorization Act (SARA) and the Occupational, Safety, and Health Act (OSHA) as detailed in 29 CFR 1910.120. This individual received the required training prior to the second assessment conducted from July 14 - 16, 1992. Field sampling personnel performed the sampling activities according to the Health and Safety Plan; however, the Health and Safety Plans, if available to field sampling personnel, were lacking approval signatures (as observed by the June 29 - July 1, 1992 assessment team). All field sampling crews had access to an approved Health and Safety Plan as observed during the assessment conducted July 14 - 16, 1992.

The majority of the field activities observed on-site were implemented in a proficient, correct, and consistent manner. Field personnel sampling terrestrial vegetation consistently applied the techniques defined in SOP EE.10 (EG&G, May 1991) for production plot and point-intercept and belt transect surveys. The field person conducting quantitative and qualitative songbird surveys deviated significantly from the methods defined in SOP EE.07 (EG&G, May 1991). Sediment sampling and water quality parameter measurements were performed by the field sampling crew in a manner consistent with the procedures defined in SOP EE.02 (EG&G, May 1991). The field crew sampling for fish was proficient in electrofishing, species identification, and fish processing techniques defined in SOP EE.04 (EG&G, May 1991). Field personnel sampling small mammals were proficient in the identification and handling of small mammals and consistently applied the techniques defined in SOP EE.06 (EG&G, May 1991) for weighing animals, inspecting animals for ectoparasites, and checking and setting traps.

3.2 FINDINGS

3.2.1 Environmental Evaluation Work Plan/Sampling and Analysis Plan

Requirement/Guidance

The U.S. Environmental Protection Agency (EPA), in *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (sections 2.3.1 and 2.3.2) (EPA, 1988) and *Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual* (sections 2.4 and 5.6) (EPA, 1989), calls for the preparation of a work plan (WP) and sampling and analysis plan (SAP). The WP and SAP present the results of the scoping and planning activities that should be completed prior to the design and implementation of a field sampling program.

The WP should present the scope and objectives of RI/FS activities, the decisions and evaluations made during the scoping process, and the role of planned tasks in accomplishing the objectives. The scoping process includes such tasks as analysis of existing data and information, development of conceptual models, preliminary development of remedial alternatives, identification of data needs, development of DQOs associated with the data needs, and the statistical basis for the design of the data collection program.

The SAP is comprised of the quality assurance project plan (QAPjP), and the field sampling plan (FSP). The QAPjP should describe the policy, organization, functional activities, and quality assurance (QA) and quality control (QC) protocols necessary to achieve the DQOs dictated by the intended use of the data. The FSP should provide guidance for all field work by defining in detail the field sampling and measurement methods to be used (or by citing procedures that describe the sampling and measurement methods). The FSP should identify the location of each sampling point, the frequency of sampling, and the types and numbers of samples including blanks and replicates to be collected at each sampling point. The FSP should be written so that a field sampling team unfamiliar with the site could gather the required samples and associated documentation (EPA, 1988).

Section 2.0, Quality Assurance Plan in the RFP Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities (EG&G, 1991d) (hereafter referred to as the QAPjP) defines the SAP for RFP as consisting of the QAPjP and the standard operating procedures (SOPs). The QAPjP further states that in addition to the site-wide SAP, the EM Department and its subcontractors will prepare WPs and FSPs specific to each operable unit (OU) which describe how each OU will be characterized and include specific background information, sampling objectives, sample location, and minimum frequency for each task and/or operation. Each OU-specific environmental evaluation work plan (EEWP) is also a separate chapter in the OU-specific RFI/RI WP. These EEWPs include the FSPs, which specify the conduct of ecological sampling activities addressed in this assessment task.

The ecology SOPs (EG&G, 1991e) refer the reader to the FSP for specific information on sample size, sample location, and statistical approach. The SOP for development of ecology FSPs states that each FSP identifies sample sites, methods for collection of samples or data, sampling intensity, sample handling and preservation, and field QA/QC protocols (EG&G, 1991f). The SOP further states that FSPs should clearly define study objectives, measurement and assessment endpoints, DQOs, and statistical design.

Section 3.0 of the QAPjP states that DQOs must be established prior to the initiation of field or laboratory work according to the methodology presented in Appendix A of the QAPjP, and that project/site specific DQOs (including PARCC parameters) will be documented in the WPs and summarized in the Quality Assurance Addenda (QAA) developed for each OU.

Observed Condition

The EEWP/SAP for OU3 does not adequately fulfill the requirements and guidance discussed above for the preparation of an RI/FS Work Plan and SAP. Attempts have been made to address the elements of Stage 1, 2, and 3 Data Quality Objectives development process. Stage 1 DQO elements are incomplete in the evaluation of existing data, development of a conceptual model, and specifying RFI/RI objectives and data needs. Stage 2 DQO elements are incomplete in the identification of data uses. Stage 3 DQO elements are incomplete in the quantitative basis for sampling design and the evaluation of feasible remedial actions.

The discussion of the DQOs in the EEWP/SAP falls short of the required methodology defined in Appendix A of the QAPjP. In addition, the QAA fails to summarize the project/site specific DQOs and indicates that DQOs for the Environmental Evaluation have not yet been determined. However, Section 8.0, the EEWP, identifies the completion of Stages 1, 2, and 3 of the DQO development process. This apparent contradiction should be resolved. Several deficiencies observed in the EEWP/SAP for OU3 are listed below.

1. **DQOs.** Stage 1 - Evaluation of historical data for OU3 concluded that few of the criteria for data useability were met and that much of the data cannot be used to perform a rigorous baseline risk assessment. Data determined to be usable has not been identified and no statement as to the uncertainty associated with that data has been provided. The conceptual model centers around exposure pathways and receptors, but it is deficient with regard to the hypothesis testing requirement (i.e. can the source be contained, removed, or treated). RFI/RI stated objectives fail to include the collection of data to evaluate remedial technologies and remedial alternatives.

   Stage 2 - The identification of data uses omits the collection of data to support a remedial alternative, health and safety concerns, or monitoring during a remedial action. The RFI/RI WP identifies as a primary data need the verification of the historical data and assumes inappropriately that the current sampling and analyses efforts will confirm previous results. Additional phases of field sampling appear linked to not confirming previous results or the detection of contaminants other than plutonium and americium.

No order of priority has been established for identified data uses. Prioritizing the data uses will dictate which data requires the highest level of data confidence and the lowest level of uncertainty. The RFI/RI SAP indicates that a statistical approach has been utilized to define the sample quantity and locations only in areas where some data exist (soil samples).

Stage 3 - The EEWP SAP provides a listing of parameters to be evaluated for each sampling effort as objectives. These objectives are not developed in a quantitative framework of hypotheses to be tested. The selection of ecological assessment and measurement endpoints, the sampling locations, the types and numbers of samples including blanks and replicates to be collected at each sampling location, and the statistical basis for the sampling designs for each data type (i.e., Type I and II error and minimum significant difference level) are not given adequate attention. The SAP does not provide a systematic sample numbering system. The objectives for precision and accuracy are entirely restricted to analytical laboratory activities.

2. **Risk and Impact Assessment Methodology.** The EEWP describes five techniques that may be used to assess risks at OU3. One of the five methods, Comparing Ecological Endpoints or Biomarkers, provides for the actual comparison of on-site populations to similar populations in reference areas. Measurement of population parameters (growth, reproduction, and mortality rates), biomarkers (biochemical, physiological, and histological indicators of exposure or effects), and parameter changes have not been discussed in a quantitative fashion.

3. **Reference Areas.** The use of reference area(s) has not been adequately defined in a quantitative context. The EEWP/SAP should describe in detail the approach to impact or risk assessment utilizing reference area(s). The comparability of ecological sampling between reference area(s) and OU3 must be defined in a quantitative manner.

4. **Toxicity Testing.** The EEWP indicates that toxicity testing will be conducted on a limited number of target species to supplement the toxicity assessments based on dose-response evaluations and comparisons to criteria. The testing procedures, numbers of organisms, duration of exposure, endpoints, and use of controls needs to be defined in the EEWP and SOPs developed prior to the initiation of testing.

Recommendations

The DQO process should be revisited, first on a generic (site-wide) basis, and then for each OU, and a firm generic methodology should be developed as recommended by the EPA Quality Assurance Management Staff (Neptune et al., 1990; Neptune and Blacker, 1990; Fairless, 1990; Ryti, 1990). The DQO process should provide the framework for development of statistically-based tools and data of sufficient quality to permit the making of decisions critical to environmental restoration within known bounds of uncertainty. EG&G should revise section 3.0 of the QAPjP to accommodate the statistical aspects of the sampling design, including the

development of the decision, the specific hypotheses to be tested, and the optimization of the design for testing these hypotheses.

The overall and generic DOE RFP (ten task) framework for the EE appears sound and the recognition of the need to periodically update the FSP and the proposed phased approach to the collection of data is commendable. Tasks 1 and 2 in the EEWP/SAPs include many of the activities that comprise important aspects of project scoping as defined in EPA guidance (EPA 1988 and 1989), such as analysis of existing data, development of conceptual models, and identification of data needs and associated DQOs. These Task 1 and 2 activities provide the basis for the design and implementation of FSPs, and the results of Tasks 1 and 2 should be presented in the EEWP/SAPs submitted to regulatory agencies and independent reviewers. The generic nature of the EEWP/SAPs precludes an assessment of the adequacy of the sampling and analysis programs in terms of providing the information needed to support quantitative decision-making.

3.2.2 Quantitative and Qualitative Songbird Surveys

Requirements/Guidance

SOP EE.07 (EG&G, May 1991), Sampling of Birds, states that quantitative songbird surveys be conducted during the nesting season (May through mid-June) between 6:00 and 10:00 am. The SOP further states that to avoid biasing the data, each quantitative survey plot should be surveyed twice each day. The SOP states that the data to be collected during a qualitative songbird survey should include all species encountered, their number, their behavior, and habitat where observed.

Observed Condition

The field sampling personnel conducted the quantitative songbird survey after the specified nesting season (June 30, 1992) and daily time interval (10:15 - 10:40 am). Each quantitative songbird plot was surveyed only once on June 30, 1992. During the qualitative songbird survey, the field sampling personnel recorded only raptor species and failed to record other species, behavior, habitats, and nesting sites. These observations were made during the following surveys:

Date: 6/30/92	Survey: Quantitative Songbird
Operable Unit: 3	Personnel: Jill Stoecker,
Station No.: TSS 5	Stoecker Ecological Consultants
Date: 6/30/92	Survey: Qualitative Songbird
Operable Unit: 3	Personnel: Jill Stoecker,
Station No.: TSS 12	Stoecker Ecological Consultants

Recommendations

All data associated with quantitative songbird surveys conducted after the nesting season, outside the 6:00 - 10:00 am daily sampling window, or resulting from only one survey of each plot should be discarded. These data will not be comparable with data collected during the nesting season and correct daily time interval. The inconsistent application of SOP EE.07, Sampling of Birds, with regard to seasonal and daily time intervals of the surveys and the bias introduced by surveying each plot only once will adversely affect the parameters of comparability and completeness. Qualitative songbird surveys should be rescheduled and the required data should be collected from all stations according to the SOP.

3.3 OBSERVATIONS

3.3.1 Vegetation

Point-Intercept Transects

1. SOP EE.10 (EG&G, May 1991) states that a 50 m tape measure will be stretched and each end will be marked with flagging. SOP EE.10 further states that each plant species intercepted by the tape measure at 1 m intervals will be recorded. An approved Document Change Notice (DCN) reducing the point intercept interval from 1 m to 0.5 m was available on-site. Transects were not marked with flagging material and the 50 m tape measure was allowed to drape over the higher vegetation, effectively shortening the overall length of the transect and 0.5 m point intercepts. Field personnel recorded only the first and second plant species intercepted at 0.5 m intervals. SOP EE.10 should be updated to reflect the change in the sampling protocol for removing the use of flagging material and the recording of the first and second plant species intercepted by the tape measure at 0.5 m intervals. A method should be implemented to retain the 50 m measuring tape in a stretched position. These observations were made during the surveying of the following transects:

Date: 6/29/92	Station No.:	TSS 11
OU 3	Personnel:	Sam Bamberg, RA Consultants
		Ingrid Hanne, RA Consultants
		Carolyn O'Hare, CH2M Hill
		Tamar Ares, CH2M Hill
Date: 6/30/92	Station No.:	TSS 8
OU 3	Personnel:	Sam Bamberg, RA Consultants
		Ingrid Hanne, RA Consultants
		Carolyn O'Hare, CH2M Hill
		Tamar Ares, CH2M Hill

Belt Transects

2. SOP EE.10 (EG&G, May 1991) states that a 50 m tape measure will be stretched and each end will be marked with flagging. Transects were not marked with flagging material and the 50 m tape measure was allowed to drape over the higher vegetation, effectively shortening the overall length (and area) of the transect. Personnel performing the belt-transect survey preceded the point-intercept sampling team. This activity could potentially result in the trampling of vegetation and interfere with point-intercept transect results. SOP EE.10 should be updated to reflect the change in the sampling protocol for removing the use of flagging material. A method should be implemented to retain the 50 m measuring tape in a stretched position. Belt transect surveys should be performed after the point-intercept transect surveys have been completed. These observations were made during the surveying of the following transects:

Date: 6/29/92	Station No.:	TSS 11
OU 3	Personnel:	Sam Bamberg, RA Consultants
		Ingrid Hanne, RA Consultants
		Carolyn O'Hare, CH2M Hill
		Tamar Ares, CH2M Hill
Date: 6/30/92	Station No.:	TSS 8
OU 3	Personnel:	Sam Bamberg, RA Consultants
		Ingrid Hanne, RA Consultants
		Carolyn O'Hare, CH2M Hill
		Tamar Ares, CH2M Hill

Production Plots

3. A production plot sample was obtained at a proposed soil sampling location. This production plot sampling effort was not located on a transect line, but co-located to coincide with soil samples. SOP EE.10 (EG&G, May 1991) states that production plots will be located every 10 m along a 50 m tape measure. SOP EE.10 should be updated to include this sampling strategy. This observation was made during the collection of production plot samples at the following location:

Date: 7/15/92	Station No.:	TSS 7
OU 3	Personnel:	Sam Bamberg, RA Consultants
		Ingrid Hanne, RA Consultants
		Carolyn O'Hare, CH2M Hill
		Tamar Ares, CH2M Hill

3.3.2 Birds

Sampling Equipment and Materials

1. SOP EE.07 (EG&G, May 1991) states the following equipment should be available to field personnel: binoculars, 50 m fiberglass measuring tape, field thermometer, flagging material, field identification guide, bound field notebook, waterproof pens, and field data forms. Field personnel did not have the necessary equipment (field thermometer, bound field notebook, waterproof pens, and field data forms) available in the field. Field personnel recorded the observations into a 3 x 5 " spiral notebook in pencil for subsequent transcription onto data forms. All field personnel should have access to the SOP in the field (for reference) and be thoroughly familiar with the SOP to ensure that the proper equipment and data collection forms are available in the field. The use of the proper data collection forms precludes transcription errors and errors of omission. The SOP should be updated to delete the requirement for recording weather conditions. RFP weather station data should be referenced. These observations were made during the following surveys:

Date: 6/30/92	Survey: Quantitative Songbird
OU 3	Personnel: Jill Stoecker, Stoecker Ecological Consultants
Station: TSS 5	
Date: 6/30/92	Survey: Qualitative Songbird
OU 3	Personnel: Jill Stoecker, Stoecker Ecological Consultants
Station: TSS 12	

Health and Safety

2. SOP EE.07 states that field personnel must have met OSHA training requirements (40 CFR 1910.120). Field personnel did not have the required SARA/OSHA training (29 CFR 1910.120) and were not familiar with the site Health and Safety plan. All field personnel should receive required SARA/OSHA training prior to field assignments. The Health and Safety Plan must be available on-site for reference. These observations were made during the following surveys:

Date: 6/30/92	Survey: Quantitative Songbird
OU 3	Personnel: Jill Stoecker, Stoecker Ecological Consultants
Station: TSS 5	
Date: 6/30/92	Survey: Qualitative Songbird
OU 3	Personnel: Jill Stoecker, Stoecker Ecological Consultants
Station: TSS 12	

Quantitative Songbird Survey

3. SOP EE.07 states that quantitative songbird plots will be either 50 m by 50 m or 100 m by 50 m. The SOP further states that surveyors should approach the plot slowly and stand quietly for one minute at the midpoint of the side which provides the best lighting. The quantitative songbird plot size was 100 m by 100 m. Field personnel did not stand quietly for one minute prior to entering the plot. Field personnel should comply with the procedures stated in the SOP. These observations were made during the following survey:

Date: 6/30/92	Survey: Quantitative Songbird
OU 3	Personnel: Jill Stoecker, Stoecker Ecological Consultants
Station: TSS 5	

3.3.3 Benthic Macroinvertebrates

Sampling Equipment and Materials

1..4 SOP EE.02 (EG&G, May 1991) states that water quality parameters will be measured according to SOP 4.2 (EG&G, August 30, 1991), Field Measurement of Surface Water Field Parameters. SOP 4.2 indicates the need for standardization of equipment by calibration against known standards or equipment. A temperature calibration log was not established for calibration of the temperature meter. A NIST traceable thermometer should be obtained and the necessary 3 point calibration of the temperature meter performed as soon as possible. This observation was made during the following sampling effort:

Date: 7/14/92	Sample: Water Quality Parameters
OU 3	Personnel: Mike Mischuk, CH2M Hill
Station: ASS 12	Karmen Klima, CH2M Hill

3.3.4 Fishes

Sampling Equipment and Materials

1. SOP EE.02 (EG&G, May 1991) states that water quality parameters will be measured according to SOP 4.2 (EG&G, August 30, 1991), Field Measurement of Surface Water Field Parameters. SOP 4.2 indicates the need for standardization of equipment by calibration against known standards or equipment. A temperature calibration log was not established for calibration of the temperature meter. A NIST traceable thermometer should be obtained and the necessary 3 point calibration of the temperature meter performed as soon as possible. This observation was made during the following sampling effort:

Date: 7/14/92
OU 3
Station: ASS 12

Sample: Water Quality Parameters
Personnel: Mike Mischuk, CH2M Hill
Karmen Klima, CH2M Hill
Richard Moos, CH2M Hill
Robert Shelden, CH2M Hill

General Considerations and Limitations

2. SOP EE.02 (EG&G, May 1991) states that the Field Sampling Plan (FSP) will indicate the species and number of specimens required for specified analysis. Species retained for tissue analysis included Longnosed Suckers, Carp, and Minnows. Longnosed Suckers and Carp were not on the FSP target list of species for tissue analysis (FSP Table 8.8) and should be added. The FSP should address the use of surrogate species when target list species are not available. This observation was made during the following sampling effort:

Date: 7/14/92
OU 3
Station: ASS 12

Sample: Electrofishing
Personnel: Mike Mischuk, CH2M Hill
Karmen Klima, CH2M Hill
Richard Moos, CH2M Hill
Robert Shelden, CH2M Hill

Handling of Samples

3. SOP EE.02 (EG&G, May 1991) states that fish collected for tissue analysis should be placed in a cooler with Blue-Ice or dry ice. SOP EE.02 further states that fish will be maintained in the cooler for no more than four hours prior to being placed in a freezer at 20° C. Fish were retained on regular ice in the field and held under refrigerated conditions overnight prior to dissection for tissue samples. The SOP should be updated to reflect these handling procedures. These observations were made during the following sampling effort:

Date: 7/14/92
OU 3
Station: ASS 12

Sample: Electrofishing
Personnel: Mike Mischuk, CH2M Hill
Karmen Klima, CH2M Hill
Richard Moos, CH2M Hill
Robert Shelden, CH2M Hill

3.3.5 Small Mammals

Baiting and Setting the Traps

1. SOP EE.06 (EG&G, May 1991) states that bait may consist of either peanut butter plus rolled oats or cornmeal, or a commercial feed. SOP EE.06 further states that a single polyester ball is to be added to each trap to provide bedding material. The bait used was

rolled oats and polyester bedding material was not added to each trap. The SOP should be updated to reflect the current practices regarding bait and bedding material. These observations were made during the following sampling efforts:

Date: 7/15/92 Personnel: Bob Stoecker, Stoecker Ecological Consultants
Stations: TSS 5 Jill Stoecker, Stoecker Ecological Consultants
OU 3

Weighing, Inspecting, and Marking the Animals

2. SOP EE.06 states that each captured animal should be marked with a pelage dye so that recapture data can be used to estimate population size. The captured animals were hair clipped for identification purposes. The SOP should be updated to reflect current identification practices. This observation was made during the following sampling efforts:

Date: 7/15/92 Personnel: Bob Stoecker, Stoecker Ecological Consultants
Stations: TSS 5 Jill Stoecker, Stoecker Ecological Consultants
TSS 6
TSS 7
TSS 8
OU 3

Documentation

3. SOP EE.06 states that data collected during the trapping of small mammals should be recorded on the Small Mammal Live-trapping Data Form (Form 5.6B). Data was collected on the Small Mammal Live-trapping Data Form EE.6A (Draft). The SOP should be updated to reflect the current version of all field data collection forms. Data collection forms should be in final form prior to field data collection activities. This observation was made during the following sampling efforts:

Date: 7/15/92 Personnel: Bob Stoecker, Stoecker Ecological Consultants
Stations: TSS 5 Jill Stoecker, Stoecker Ecological Consultants
TSS 6
TSS 7
TSS 8
OU 3

3.3.6 Corrective Actions

1. A corrective actions report was issued by EG&G addressing the findings of the October 1 - 3, 1991 ecological field sampling assessment. The recommendation to more closely integrate the abiotic and biotic sampling activities has been followed for the RFI/RI WP developed for OU 3. The recommendation for the development and implementation of an SOP describing protocols for the prevention and minimization of the potential for cross contamination of fish tissue samples during field processing and handling apparently has not been developed. The observed procedures utilized to minimize cross contamination during the processing of fish tissue samples included changing the paper covering the cutting board and rinsing of equipment and gloves. The recommendation for the addition of protocols for sample containers, preservation, handling, and shipping of all biological samples to SOP FO.13 apparently has not been implemented. The ecological sampling efforts observed did not include containerization, preservation, or shipment of biological samples.

3.4 ADDITIONAL RECOMMENDATIONS

3.4.1 Fishes

1. The decontamination procedures utilized during the processing of fish appear adequate to minimize the potential for cross contamination. These procedures (changing the paper covering the cutting board and rinsing of equipment and gloves) should be incorporated into SOP EE.04.

3.4.2 Small Mammals

1. A new, clean plastic bag for containing specimens during processing should be used on every sampling site to minimize the potential for cross contamination between sampling stations. This procedure should be incorporated into SOP EE.06.

3.4.3 Health and Safety

1. The current, approved site-specific Health and Safety Plan (HSP) must be available to all field personnel and maintained on-site for reference (29 CFR 1910.120). Field personnel should be thoroughly familiar with the site HSP and documentation should be established that indicates field sampling personnel have read and understood the HSP.

3.4.4 Sampling and Analysis Plan

1. The current, approved site-specific Sampling and Analysis Plan (SAP) should be available to all field personnel and maintained on-site for reference. Contract personnel involved in the sampling efforts and EG&G management responsible for contractor performance should be thoroughly familiar with the SAP prior to initiation of sampling efforts.

3.4.5 Standard Operating Procedures

1. Revisions to the SOPs should be in place well before the sampling efforts are scheduled. At a minimum, all DCNs must be available in the field to reference current procedures. A mechanism should be instituted by EG&G to ensure that DCNs are incorporated into the SOP and distributed in a timely manner. All changes to the SOPs which impact the FSP should be incorporated into the periodic updates to the FSP. These documents are critical to the collection of data, and they should in no way contradict each other regarding data collection procedures.

3.4.6 Management Procedures

1. The coordination and management of the ecological sampling efforts needs improvement. This may be accomplished under the existing contractual structure by providing addition support personnel to monitor the efforts and schedules of the myriad of contractors and subcontractors. The preferred method to improve the management of the sampling efforts would be to place the Environmental Evaluation sampling under one contract.

4.0 IMPACT OF FIELD SAMPLING ACTIVITIES ON ATTAINMENT OF DQOs

The main objective of this effort was to assess the quality of ecological field activities with regard to attainment of DQOs. In preparation for the on-site assessment, project and OU-specific documentation of the technical basis for the sampling program, particularly with regard to the development of DQOs and their expression in the design of the field program, was reviewed. This section summarizes the results of this evaluation effort with regard to both of these general sources of error in the environmental measurement process.

The DQO process for ecological data collection is not considered in the EEWP/SAP in a meaningful way, primarily due to the generic nature of the EEWP and the fact that a generic framework for DQO development such as that recommended by the EPA Quality Assurance Management Staff (Neptune et al., 1990; Neptune and Blacker, 1990) has not been implemented. In many cases, the specific uses for the various types of ecological data are not defined, hypotheses (i.e., decision rules and logic statements) are not formulated, and acceptable levels of uncertainty in the decision-making process are not identified. With regard to the PARCC parameters, precision and accuracy are defined only for laboratory analysis activities.

With the exception of the benthic macroinvertebrates (triplicate samples), the EEWP/SAPs do not call for the collection of duplicate or replicate samples. Therefore, field variability, which is the major source of random error affecting precision, is not addressed for the remaining ecological data types. The statistical basis for selecting triplicate benthic macroinvertebrate samples is not discussed, precluding an assessment of adequacy. With the exception of benthic macroinvertebrates, the field sampling design does not contribute to the estimation and attainment of acceptable levels of precision needed to attain DQOs.

In view of these deficiencies, an overall assessment of the impact of ecological data collection activities (i.e., design and implementation of the field program) on DQOs is not possible. However, this did not preclude the evaluation of the quality of the field activities and their contribution to attaining DQOs.

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Rocky Flats Plant Final Work Plan RFI/RI Work Plan for OU3, U. S. Department of Energy, Rocky Flats Plant (December, 1991)

ATTACHMENT A

DRAFT FINAL

PROCEDURES FOR CONDUCTING FIELD SURVEILLANCE OF ECOLOGICAL SAMPLING AT THE U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Prepared by the
HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
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MARTIN MARIETTA ENERGY SYSTEMS INC.
for the

U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

CONTENTS

ACRONYMS

ASME	American Society of Mechanical Engineers
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm	centimeters
CMS	Corrective Measures Study
dc	direct current
DOE	U.S. Department of Energy
DQOs	Data Quality Objectives
EE	Environmental Evaluation
EEWP	Environmental Evaluation Work Plan
EG&G	Name of contractor company
EM	Environmental Restoration and Waste Management
EMAD	Environmental Monitoring and Assessment Division
EMD	Environmental Management Department
EPA	Environmental Protection Agency
ER	Environmental Restoration
FS	Feasibility Study
FSP	Field Sampling Plan
HAZWRAP	Hazardous Waste Remedial Action Program
H&S	Health and Safety
HQ	Headquarters
HSP	Health and Safety Plan
IAG	Interagency Agreement
ICS	Integrated Computer Systems, Inc.
mm	millimeters
M.S.	Master of Science
NQA	Nuclear Quality Assurance
OSHA	Occupational, Safety, and Health Administration
OU	Operable Unit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
QAA	Quality Assurance Addendum
QAMS	Quality Assurance Management Staff
QAP	Quality Assurance Program
QAPjP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RFO	Rocky Flats Operations
RFP	Rocky Flats Plant
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
SOPA	Standard Operating Procedure Addendum
SOW	Statement of Work

SOP	Standard Operating Procedures
SOPA	Standard Operating Procedure Addendum
SOW	Statement of Work
WP	Work Plan

1. PURPOSE

The purpose of these procedures is to provide Hazardous Waste Remedial Actions Program (HAZWRAP) personnel guidance for planning, conducting, and reporting field surveillances of ecological sampling activities at the U.S. Department of Energy (DOE) Rocky Flats Plant (RFP). The surveillance activities described herein are being undertaken as part of HAZWRAP's support to DOE's Office of Environmental Restoration and Waste Management, Division of Southwestern Programs (EM-45). The objective of these activities is to evaluate the technical and regulatory activities and issues associated with the Environmental Restoration (ER) Program at RFP. Under HAZWRAP's statement of work (SOW), expertise is being provided in numerous areas, including quality assurance (QA). This QA support includes evaluation of QA programs, general QA oversight reviews, and analysis and/or review of the RFP QA program and supporting programs.

These surveillance activities directly support EM-40's Quality Assurance Program (QAP), under which DOE-HQ has responsibility for the assessment of contractor activities at RFP and other DOE installations. DOE Order 5480.19 requires that DOE managers oversee and evaluate the technical performance of contractors and vendors relative to applicable procedures and requirements. These oversight and evaluation efforts include periodic surveillance of field sampling activities and associated documentation in order to assess: (1) adherence to applicable Standard Operating Procedures (SOPs), field sampling plans, QA/quality control (QC) protocols, and health and safety guidelines; and (2) attainment of data quality objectives (DQOs). This effort helps fulfill EM-40's requirements under the QAP to provide guidance to the DOE Field Operations Offices and environmental restoration sites and to conduct surveillances and audits of contractor performance. This effort will help assure that ER activities at RFP are consistent with current DOE orders and guidance, EM-40 management plans, technical and scientific practices, and applicable federal, state, and local requirements.

Included herein is a delineation of the requirements associated with the ecological surveillance effort (Section 2), the responsibilities of all key individuals involved in the surveillance process (Section 3), and the detailed surveillance instructions (Section 4).

2. REQUIREMENTS

Data generated during environmental restoration efforts at RFP must be scientifically and legally defensible and must be of a quality sufficient to ensure that the needs of quantitative decision making are served. To assure the required level of data quality, rigorous and meaningful QA protocols must be established and vigorously implemented.

As discussed in Section 2 (*Quality Assurance Program*) of the *RFP Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigations/Feasibility Studies and RCRA Facilities Investigations/Corrective Measures Studies* (QAPjP), the requirements for developing a quality assurance program for environmental restoration activities at RFP are established in DOE orders and the RFP Interagency Agreement (IAG).

DOE Order 5400.1, *General Environmental Protection Program*, establishes environmental protection program requirements for DOE operations, including development and implementation of a quality assurance program that is consistent with DOE Order 5700.6B. Order 5700.6B, *Quality Assurance*, requires that any quality assurance program at any DOE facility be founded on the elements of the American Society of Mechanical Engineers NQA-1, *Quality Assurance Program Requirements for Nuclear Facilities*.

The IAG, on the other hand, requires a Quality Assurance Project Plan (QAPjP) to be developed on the basis of Environmental Protection Agency (EPA) guidance contained in EPA/QAMS/005/80, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*. At RFP, NQA-1 provides the overall framework for the QA program (e.g., these elements define the sections of the QAPjP). The 16 QA elements of EPA QAMS-005/80 have been integrated into the NQA-1 framework, as defined in Fig. 2-1 of the QAPjP.

Together, the QAPjP and the site-wide EG&G SOPs define the Sampling and Analysis Plan (SAP). Operable Unit (OU)-specific sampling and analysis requirements, including QA protocols, are documented in each Work Plan (WP), as well as the Quality Assurance Addendum (QAA) and any SOP Addenda (SOPA). The Field Sampling Plan (FSP) is included in the WP.

DQOs are qualitative and quantitative statements specified to ensure that data of known and sufficient quality are obtained in the field sampling effort. Development of DQOs is the central focus of the EPA Quality Assurance Management Staff (QAMS) guidelines. Virtually all QA/QC activities not related to occupational health and safety considerations are conducted to assure achievement of DQOs. DQOs are addressed generically (i.e., on a site-wide basis) in Section 3 (Design Control and Control of Scientific Investigations) and Appendix A (Data Quality Objective Development Process) of the QAPjP. According to the QAPjP, DQOs specific to individual OUs are developed in each unit-specific WP/FSP, QAA and SOPA.

DQOs are generally defined in terms of the five PARCC parameters (i.e., Precision, Accuracy, Representativeness, Completeness, and Comparability). According to the QAPjP, the specific objectives associated with each of these parameters are dependent on the intended uses of the data and should be described in the WP/QAA before initiating any sampling or analysis activities. These five parameters and their relationship to surveillance of ecological sampling efforts are defined as follows:

Precision of an environmental measurement process is a measure of mutual agreement among individual measurements of the same parameter, usually under prescribed similar conditions. Precision is usually expressed in terms of the standard deviation of an individual observation or the standard error of the mean. Precision (or lack thereof) is determined by random errors that can be introduced into the measurement process in the field during sample collection, handling, transportation, and preparation (for shipment to the laboratory). In the laboratory, random errors can be introduced during subsampling of the field sample, while preparing the subsample for analysis, during the analysis itself, and in the data management process. In most cases, the major source of random error affecting precision is the inherent spatial variability in the parameter (field variability), which can be measured through the use of QA/QC samples. Duplicates (i.e., collocated field samples) can be used to estimate total measurement error, while replicates (preparation splits of a single field sample) can be used to estimate measurement error contributed during all subsequent stages of the measurement

process. For some biological parameters where subsampling (i.e., sample splitting) is not possible (e.g., benthic macroinvertebrate sampling), estimating field (i.e., real world) variability independently from the other sources of random error that affect precision cannot be accomplished. An estimate of precision is generally needed to design a quantitative sampling program (i.e., one that will produce data needed for hypothesis testing and quantitative decision making). The field surveillance effort will contribute to an evaluation of the adequate estimation and attainment of acceptable levels of precision by evaluating the adequacy of duplicate and replicate samples and by identifying inconsistent application of the sampling protocol (i.e., SOP).

Accuracy is a measure of the agreement of a measurement (or the mean of several measurements of the same parameter) with an accepted reference or true value. Since the "true" value of an environmental parameter is never known, accuracy itself cannot be assessed and is, therefore, expressed in terms of bias. Bias results from systematic errors that can accumulate during a measurement process because of inappropriate sampling design, sampling procedure, analytic procedure, contamination, losses, deterioration, and inaccurate instrument calibrations. In sampling environmental media for contaminant burdens, bias is usually estimated or detected with various QC samples, such as blanks and spikes. This approach is largely inapplicable to sampling for biotic parameters. The field surveillance effort will contribute to an evaluation of the attainment of accuracy through a review of the sampling design and by identifying systematic errors introduced during sample collection from consistent misapplication of the protocol (SOP) or application of an SOP that is not appropriate for the particular site-specific situation.

Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness can be influenced by both the design of the sampling program and its implementation. In particular, representativeness is dependent on selection of a sampling methodology that generates estimates of population means and variances that are representative of the true parameter values. According to the QAPjP, options chosen for sampling and analysis must be specifically described in the WP, preferably in the FSP. In the ecological surveillance effort, representativeness is assessed by evaluating the sampling design, the methodology for selection of sampling locations, and the random and systematic errors introduced into the process of sample collection and field preparation that adversely affect precision and accuracy, particularly the use and selection of sampling tools.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected under correct normal conditions. Goals for completeness at RFP are specified in the FSP/QAA. Collection of samples identified as "critical" must be 100% complete. If sampling is substantially incomplete, particularly with regard to critical samples, representativeness could be severely impacted. Completeness can be compromised in a field effort by not attempting to collect (i.e., overlooking) designated samples, unsuccessful collecting of designated samples, and by the eventual rejection of samples because of evidence of the presence of significant systematic or random errors. Attainment of completeness is highly dependent on the availability of a well-documented field sampling plan that clearly lays out the information to be collected in the field program. During the preparation for the on-site surveillance, the SOPs and documentation for the field

effort are evaluated to identify potential sources of error that could ultimately lead to failure to collect some samples. The on-site surveillance identifies sources of systematic and random errors that could potentially lead to the rejection of some or all of the samples and insufficient completeness.

Comparability is a measure of the confidence with which one data set can be compared to another. Comparability is best accomplished by adherence to the same SOPs across studies, wherever appropriate, and by development of SOPAs as needed to address site-specific conditions. A field surveillance activity can assess comparability by evaluating the consistency in the degree of adherence to a particular SOP across OUs. This would be particularly important in cases where different field teams are employed in the collection of these data. Comparability can also be assessed by evaluating the appropriateness of the SOP to the range of conditions found across the various OUs and the adequacy of the SOPA in addressing these site-specific differences.

The product of a field QA/QC surveillance effort is an evaluation of the degree to which the sampling data contribute to meeting OU-specific DQOs.

It is important to recognize that the design and implementation of a field effort are just two of several components of the environmental measurement process for restoration activities at RFP. Total error in the measurement process is the sum of the random and systematic errors associated with design, field, laboratory, and data management activities.

3. RESPONSIBILITIES

Key individuals involved in the planning, scheduling and implementation of field surveillance activities include the DOE Rocky Flats Office Manager of the Environmental Restoration Division or her or his designee (hereafter referred to as the "DOE RFO Manager"), the HAZWRAP Project Manager, the HAZWRAP Quality Assurance Officer, and the individual designated by the DOE contractor as the one responsible for the implementation of the field sampling program. The responsibilities of each of these individuals is discussed in the following sections.

3.1 THE HAZWRAP PROJECT MANAGER

The HAZWRAP Project Manager will be the point of contact with the DOE RFO Manager. This individual will be responsible for the following activities:

- Assign qualified field surveillance personnel, including a HAZWRAP Quality Assurance Officer, to lead the field surveillance effort;

- Coordinate the scheduling of field surveillance activities and the submission of reports with the DOE Rocky Flats Office (RFO) Manager and the HAZWRAP Quality Assurance Officer;

- Oversee, review, and approve all field surveillance activities and reports; and,

- Provide documentation of ecological sampling activities to the HAZWRAP Quality Assurance Officer on a schedule that permits adequate presurveillance planning;

3.2 THE HAZWRAP SURVEILLANCE TEAM

The HAZWRAP surveillance team will be led by a HAZWRAP Quality Assurance Officer who is designated by the HAZWRAP Project Manager, and will include such other qualified individuals as needed to carry out the surveillance effort. The responsibilities of this team include the following:

- Plan and conduct the field surveillance, including a review and evaluation of documentation associated with the surveillance and development/modification of checklists to facilitate documentation of the surveillance;

- Prepare a field surveillance report and submit the report to the HAZWRAP Project Manager; and,

- As required, evaluate corrective action responses and conduct follow-up surveillance activities to evaluate the effectiveness of these actions.

3.3 THE DEPARTMENT OF ENERGY ROCKY FLATS OFFICE MANAGER

The DOE RFO Manager will be responsible for the following activities:

- Schedule the surveillance with the contractor and the HAZWRAP Project Manager;

- Provide documentation of ecological sampling activities to the HAZWRAP Project Manager on a schedule that permits adequate presurveillance planning;

- Evaluate the surveillance results as presented in the field surveillance report;

- If necessary, initiate, track, and evaluate corrective actions; and,

- Coordinate the scheduling of field surveillance activities and the submission of reports with the HAZWRAP Project Manager.

3.4 THE SURVEILLED CONTRACTOR

The surveilled contractor(s) will be responsible for the following activities:

- Identify the manager who will serve as the primary point of contact for communications with the DOE RFO Manager and the HAZWRAP Project Manager;

- Provide documentation of ecological sampling activities to the DOE RFO Manager on a schedule that permits adequate presurveillance planning;
- Coordinate the scheduling of field surveillance activities with the DOE RFO Manager; and,
- Provide the field surveillance team access to key personnel, field sampling teams, and facilities, as needed.

4. SURVEILLANCE INSTRUCTIONS

4.1 OVERVIEW OF SURVEILLANCE ACTIVITIES

The field surveillance activities will include the following:

- Planning and scheduling the surveillance;
- Conducting pre- and post-surveillance meetings;
- Performing the surveillance;
- Reporting the surveillance results to the HAZWRAP Project Manager; and,
- Conducting follow-up surveillances to evaluate and verify corrective actions, as required.

Surveillance planning and scheduling activities include assigning personnel and scheduling activities, reviewing and evaluating documentation associated with the surveillance, and developing/modifying checklists to facilitate documentation of the surveillance. The following sections address each of these activities associated with the field surveillance process.

4.2 SURVEILLANCE PLANNING AND SCHEDULING

4.2.1 Assigning Personnel and Scheduling Activities

The HAZWRAP Project Manager will select the other members of the field surveillance team, assign responsibilities to team members, and coordinate the scheduling of the field activities and documentation exchanges with the DOE RFO Manager. The HAZWRAP Project Manager will distribute the documentation received from the DOE RFO Manager to the Quality Assurance Officer and other members of the field surveillance team. The HAZWRAP Project Manager will maintain documentation of the credentials of all members of the field surveillance team, and will provide these records to the DOE RFO Manager, on request.

4.2.2 Reviewing Documentation

The field surveillance team will review relevant portions of the most current approved versions of the following RFP-specific documentation:

- The Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) work plan which describes the overall field sampling effort;
- The site-specific sampling plan upon which the field sampling activities are based;
- Rocky Flats Plant Site-Wide QA Project Plan for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) RI/Feasibility Study (FS) and RFI/Corrective Measures Study (CMS) Activities;
- Quality Assurance Addenda (QAA) to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities and Addenda;
- Standard Operating Procedures, Ecology 5.0;
- Standard Operating Procedures, Field Operations;
- Standard Operating Procedures, Surface Water;
- Rocky Flats Plant Environmental Restoration Health and Safety Program Plan and Addenda.

4.2.3 Evaluating the Documentation

The field surveillance team will evaluate those components associated with the design and actual collection program that can, in any way, affect the quality of the data to be collected. Attainment of data quality objectives will require strict adherence to approved Standard Operating Procedures (SOPs), proper design of the field sampling effort, inclusion of adequate and appropriate QA/QC requirements, and compliance with health and safety guidelines. Specific items to be assessed include the following:

- Qualification and training of personnel;
- Equipment calibration;
- Equipment suitability and maintenance/repair;
- Sample site location and marking (esp. the ability to relocate);
- Sample collection techniques;
- Field quality control samples such as duplicates, trip and field blanks;
- Sample containers and preservation techniques;

- Sample tags and chain of custody documentation;
- Availability of plans and procedures to the sampling team;
- Field documentation (e.g., field logs);
- Decontamination and equipment cleaning; and,
- Disposition of investigation-derived waste.

In conducting this evaluation, at a minimum, portions of the following EPA guidance relevant to the DQO development process should be reviewed:

Environmental Protection Agency (EPA) 1987a. *Data Quality Objectives for Remedial Response Activities: Development Process*, Office of Emergency and Remedial Response, EPA/540/G-87/003.

Environmental Protection Agency (EPA) 1987b. *Data Quality Objectives for Remedial Response Activities, Example Scenario: RI/FS Activities at a Site with Contaminated Soil and Ground Water*, Office of Emergency and Remedial Response, EPA/540/G-87/004.

Environmental Protection Agency (EPA) 1989a. *Report on Minimum Criteria to Assure Data Quality*, EPA/530-SW-90-021.

Environmental Protection Agency (EPA) 1989b. *Risk Assessment Guidance for Superfund: Volume II. Environmental Evaluation Manual*, Office of Solid Waste and Emergency and Remedial Response, EPA/540/1-89/001.

Environmental Protection Agency (EPA) 1989c. *Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference*, Environmental Research Laboratory, EPA/600/3-89/013.

Environmental Protection Agency (EPA) 1990a. *Guidance for Data Useability in Risk Assessment*, Interim Final, Office of Emergency and Remedial Response, EPA/540/G-90/008.

Other documents relevant to the quality assessment of ecological data are provided in Section 5.0.

If the field surveillance team identifies any inadequacies in any of this documentation that could impact the ability of the data to meet DQOs, the HAZWRAP Quality Assurance Officer will notify the HAZWRAP Project Manager, who will then communicate these findings to the DOE RFO Manager.

4.2.4 Preparing/Modifying Checklists

The field surveillance team will prepare/modify surveillance checklists based on the document review and evaluation. These checklists will identify those components of the SOPs that will be

observed by the surveillance team while the field team is collecting samples. The checklists will include, as appropriate, all those items to be evaluated under Section 4.2.3, above.

Draft surveillance checklists will be submitted to the HAZWRAP Project Manager for review and approval prior to being submitted to the DOE RFO Manager for review. Any comments received from the DOE RFO Manager in a timely manner will be incorporated into the final checklists.

4.3 PRESURVEILLANCE MEETING

Before conducting the surveillance, the HAZWRAP Project Manager and Quality Assurance Officer will hold a meeting with DOE RFO and the DOE contractor personnel at RFP who will be responsible for carrying out the field sampling effort. This purpose of this meeting is to initiate lines of communication, coordinate in-field activities, and schedule a post-surveillance meeting to discuss results of the surveillance, as appropriate.

4.4 PERFORMING THE SURVEILLANCE

In performing the in-field surveillance, field activities will be observed to determine whether or not they conform to the specified protocols which are included in the checklists. All departures from the QA/QC protocols will be categorized as findings or observations. Findings and observations, and recommendations are defined as follows:

Finding: Identification of a clear violation of a specific requirement or guidance that potentially or actually results in collection of ecological data of unacceptable or indeterminate quality.

Observation: Identification of a discrepancy between field activities and specific requirements or guidance that, in and of itself, would not result in ecological data of unacceptable or indeterminate quality, however, a number of observations for the same activity or related activities could result in the determination of a finding.

Recommendations for corrective actions were made for each finding and observation. Additional recommendations for improving the ecological sampling activities and supporting documentation were also made.

Any surveillance findings or observations associated with the actual implementation of field sampling efforts will be recorded on the surveillance checklists and discussed in the field surveillance report. Because of their potential to seriously impact attainment of data quality objectives, findings will be reported to the HAZWRAP Manager and DOE RFO Manager as soon as practicable.

4.5 POST-SURVEILLANCE MEETING

Upon conclusion of the in-field surveillance, a meeting will be held. To the extent practicable, findings or observations resulting from the in-field quality assessment activities will be discussed. The post-surveillance meeting should include the HAZWRAP Project Manager and Quality Assurance Officer, the DOE RFO Manager, and the member of the surveyed organization responsible for the implementation of the field activities.

The objectives of the post-surveillance meeting are to:

- Discuss the surveillance findings, observations and recommendations to the extent practicable; and,
- Determine and resolve any errors or misunderstandings regarding the findings, observations, and recommendations.

4.6 REPORTING THE SURVEILLANCE

Following the post-surveillance meeting, the surveillance team will describe and document the results of the in-field surveillance in a field surveillance report, which will include the following, as applicable:

- Description of surveillance purpose and scope;
- Identification of the surveillant(s);
- Identification of all contractor personnel providing input during the in-field surveillance activities;
- Description of any findings/observations/recommendations;
- Identification of appropriate corrective actions; and,
- Copies of checklists and other significant documentation generated during the surveillance.

In developing this field surveillance report, the HAZWRAP surveillance team will review any available reports on the results of similar or related audits or surveillances conducted to date. If any findings of nonconformance are identified in these reports, the HAZWRAP surveillance team will also review the associated corrective action report(s).

The field surveillance report will be submitted to the HAZWRAP Project Manager, who will review and approve the report and submit it to the DOE RFO Manager within 20 working days following the post-surveillance meeting. Following DOE review and approval, the DOE RFO Manager should forward the report or relevant portions thereof, to the DOE contractor.

4.7 SURVEILLANCE FOLLOW-UP

Should the surveillance report include any findings, follow-up activities will be required. The DOE RFO Manager will interact with the contractor to verify the validity of each finding, establish a corrective action plan to address each finding, and schedule the implementation of the corrective action plan. The corrective action plan and schedule for implementation will be documented by the contractor in a corrective action report, and the report will be submitted to the DOE RFO Manager. This report will include all information necessary to describe adequately the corrective action that was taken in response to each finding. At a minimum, this report should include the following:

- Root-cause analysis;
- Impact on present and completed work;
- Corrective action planned/taken; and
- Date when corrective action will be completed.

If requested by the DOE RFO Manager, the HAZWRAP surveillance team will conduct follow-up surveillances designed to verify that corrective actions have been properly implemented, and to evaluate their success. The DOE RFO Manager will provide to the HAZWRAP Project Manager a copy of the contractor's corrective action report, and will coordinate the scheduling of the follow-up surveillance with to the HAZWRAP Project Manager.

Conduct of the follow-up surveillance activities will follow along the lines of the initial surveillance activities, except the scope of the surveillance may be restricted to only those components related to the finding(s). The surveillance team will report the results of the follow-up surveillance to the DOE RFO Manager in writing within 20 working days following the completion of the surveillance effort.

5. ADDITIONAL GUIDANCE ON DATA QUALITY OBJECTIVE DEVELOPMENT

Environmental Protection Agency (EPA) 1980. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* Quality Assurance Management Staff, EPA-600/483-004.

Environmental Protection Agency (EPA) 1983. *Guidelines and Specifications for Preparing Quality Assurance Program Plans,* Quality Assurance Management Staff, EPA-600/8-83-024.

Environmental Protection Agency (EPA) 1986a. *Development of Data Quality Objectives, Description of Stages I and II,* Quality Assurance Management Staff, July 16, 1986.

Environmental Protection Agency (EPA) 1986b. *CLP Statistical System Database,* Office of Emergency and Remedial Response.

Environmental Protection Agency (EPA) 1987c. *USEPA Contract Laboratory Program Statement of Work for Dioxin Analysis: Multi-media, Multi-concentration,* Office of Emergency and Remedial Response, SOW No. 9/86, Rev. 8/87.

Environmental Protection Agency (EPA) 1988a. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA,* Interim Final, Office of Emergency and Remedial Response, EPA/540/G-89/004.

Environmental Protection Agency (EPA) 1988b. *User's Guide to Contract Laboratory Program,* Office of Emergency and Remedial Response, EPA/540/8-89/012.

Environmental Protection Agency (EPA) 1989a. *RCRA Facility Investigation (RFI) Guidance, Volumes I - IV,* Office of Solid Waste, EPA 530/SW-89-031.

Environmental Protection Agency (EPA) 1989b. *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual Part A,* Office of Solid Waste and Emergency and Remedial Response, EPA/540/1-89/002.

Environmental Protection Agency (EPA) 1989c. *Risk Assessment Guidance for Superfund: Volume II Environmental Evaluation Manual,* Office of Solid Waste and Emergency and Remedial Response, EPA/540/1-89/001.

Environmental Protection Agency (EPA) 1989d. *Soil Sampling Quality Assurance User's Guide,* Office of Research and Development, Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA/600/8-89/046.

Environmental Protection Agency (EPA) 1989e. *Methods for Evaluating the Attainment of Cleanup Standards, Volume I, Soils and Solid Media,* Office of Policy, Planning and Evaluation, EPA/230/2-89/042.

Environmental Protection Agency (EPA) 1989f. *Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference,* Environmental Research Laboratory, EPA/600/3-89/013.

Environmental Protection Agency (EPA) 1990a. *A Rationale for the Assessment of Errors in the Sampling of Soils,* Office of Research and Development, Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA/600/4-90/013.

Environmental Protection Agency (EPA) 1990b. *Guidance for Data Useability in Risk Assessment,* Interim Final, Office of Emergency and Remedial Response, EPA/540/G-90/008.

Fairless, B. 1990. "Applying Total Quality Principles to Superfund Planning. Part II. DQOs in Superfund: A Dioxin Case Study," *Seventeenth Annual National Energy Division Conference,* American Society for Quality Control, September 1990.

Messner, M.J., C.A. Clayton, D.I. Michael, M.D. Neptune, and E.P. Brantly. 1990. "Retrospective Design Solutions for a Remedial Investigation," supplement to "Quantitative Decision Making in Superfund, A Data Quality Objective Case Study," in *Hazardous Materials Control* Volume 3, Number 3.

Neptune, D. and S.M. Black. 1990. "Applying Total Quality Principles to Superfund Planning. Part I. Upfront Planning in Superfund," *Seventeenth Annual National Energy Division Conference*, American Society for Quality Control, September 1990.

Neptune, D., E.P. Brantly, M.J. Messner, and D.I. Michael. 1990. "Quantitative Decision Making in Superfund, A Data Quality Objective Case Study," *Hazardous Materials Control* 3 (3): 18-27.

Ryti, R. 1990. "Applying Total Quality Principles to Superfund Planning, Part III. Evaluation of Design Alternatives for a Superfund Site," *Seventeenth Annual National Energy Division Conference*, American Society for Quality Control, September 1990.

ATTACHMENT B

EE.10 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF VEGETATION

U.S. Department of Energy, Rocky Flats Plant

Prepared by: Integrated Computer Systems for the Hazardous Waste Remedial Action Program (HAZWRAP)

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.10 Sampling of Vegetation

VOLUME V ECOLOGY-I. GENERAL INFORMATION

Surveillance Date: 6/29/92 Time: 1:00 PM

Surveiller(s): J. Otten, Alan Stephens, John Martinson

Operable Unit No./Station Number(s): OU3 / TSS 11

Is SOP EE.10 the procedure used by field team? ☒ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Ingrid Hamre	RA Consultants	MS	16
Sam Barrera	RA Consultants	PhD	35
Tamar Ares	CH2M Hill	BS	2
Carolyn O'Hara	CH2M Hill	BS	1

Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0, Para 1) ☒ Yes ☐ No

Comments: SOP EE.10 w/ Document Change Notices which were unavailable.

II. SAMPLING EQUIPMENT/MATERIALS

1. Are the equipment/materials inspected and maintained on a regularly scheduled basis? Not Applicable ☐ Yes ☐ No

2. Are records or logs kept identifying: Not Applicable to types of equipment used during point and belt transect surveys.
   - ☑ inspection dates?
   - ☐ inspection results?
   - ☑ inspector's name?
   - ☐ actions taken?

3. Were the correct types and amounts of equipment/materials taken into the field? ☑ Yes ☐ No

4. Were decontamination procedures and requirements met? N/A ☐ Yes ☐ No

5. Were waste management procedures and requirements met? N/A ☐ Yes ☐ No

Comments: _____

III. HEALTH AND SAFETY

1. Is the most current HSP available for review? ☐ Yes ☒ No

2. Are the H&S guidelines and requirements documented in the HSP? ☒ Yes ☐ No

3. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☒ Yes ☐ No

Comments: II. Sampling Equipment/Materials - Not applicable due to non-intrusive activities

IV. FIELD SAMPLING ACTIVITIES

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Operable Unit No./Station Number(s): OU3 TSS 11

Surveillance Date: 6/29/92 Time: 1:30PM

Surveiller(s): James Otter, Alan Stephens, John Martinson

Quantitative Community Surveys

Point - Intercept Transects

1.	Were survey transects located and oriented as specified in SAP? (Section 6.2.1, Para 2)	☑ Yes	☒ No (1)
2.	Were 50 m transects (multiple shorter transects that total 50 m) measured with a tape and marked with flagging? (Section 6.2.1, Para 2)	☐ Yes	☑ No
3.	Did the observer walk along the stretched tape and record each plant (by species) intercepted ("hit") by the tape measure at 1 m intervals (i.e., 50 hits per transect)? (Section 6.2.1, Para 2)	☐ Yes	☑ No
4.	If a live plant was not intercepted, did the observer record if the "hit" was litter, rock, or bare soil? (Section 6.2.1, Para 2)	☑ Yes	☐ No

Belt Transects

1.	Were belt transects established 1 m to each side of point-intercept transects for a total of 100 m^2 and located and oriented as specified in SAP? (Section 6.2.2, Para 1)	☐ Yes	☒ No
2.	Did the observer walk along the transect, count, and record each shrub, subshrubs, cacti, and yucca that are more than half contained in within the belt? (Section 6.2.2, Para 1)	☒ Yes	☐ No
3.	Did the observer walk along the transect, count, and record each plant species present within the belt? (Section 6.2.2, Para 1)	☒ Yes	☐ No

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Production Plots

1.	Were survey transects located and oriented as specified in SAP? (Section 6.2.3, Para 1)	☐ Yes	☐ No	N/A
2.	Were 50 m transects (multiple shorter transects that total 50 m) measured with a tape and marked with flagging? (Section 6.2.1, Para 2)	☒ Yes	☐ No	N/A
3.	Did the observer place the 0.5 m^2 quadrant frame at 10 m intervals along the side of the 50 m tape and record all species present within the quadrant and the sample point ID at each location? (Section 6.2.3, Para 1)	☐ Yes	☐ No	N/A
4.	Did the observer measure the height of the three tallest individual plants within the quadrant and record by species? (Section 6.2.3, Para 1)	☒ Yes	☐ No	N/A
5.	Did the observer clip all above-ground, current years growth herbaceous species (not woody plants, cacti, or yucca) within the quadrant (canopies of plants with their crowns outside the frame should not be clipped)? (Section 6.2.3, Para 1)	☐ Yes	☐ No	N/A
6.	Did the observer sort the clipped material by species (for major species) and place each species into properly labelled paper bags? (Section 6.2.3, Para 1) (Note: major species are those species "hit" along the line-intercept transect during the collection of cover data.)	☐ Yes	☐ No	N/A
7.	Did the observer lump minor species by lifeform? (Section 6.2.3, Para 2) (Note: minor species are those species not "hit" along the line-intercept transect during the collection of cover data.)	☐ Yes	☐ No	N/A
8.	If the FSP specified the clipping of standing biomass, was the biomass clipped and placed in a labelled paper bag at each quadrant location? (Section 6.2.3, Para 1)	☒ Yes	☐ No	N/A

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

9.	If the FSP specified the collection of plant litter, was the litter gathered and placed in a labelled paper bag at each quadrant location? (Section 6.2.3, Para 1)	☐ Yes	☐ No	N/A
10.	Was the clipped material and litter oven dried in the bag (104° C for 24 hours) and the contents of each bag weighed to the nearest 0.1 gram? (Section 6.2.3, Para 2)	☐ Yes	☐ No	N/A

Quantitative Community Surveys

1.	Was the entire study area traversed and the species recorded along with abiotic data such as substrate, topography, and soil moisture in the field logbook? (Section 6.3.1, Para 2)	☐ Yes	☐ No	N/A

Tissue Collection

1.	Were the locations, species, tissues (fruits, foliage, roots), and sample sizes specified in the FSP? (Section 6.4, Para 1)	☐ Yes	☐ No	N/A
2.	Were the specific plants located in accordance with the FSP? (Section 6.4, Para 2)	☐ Yes	☐ No	N/A
3.	Were the appropriate tissues clipped with uncontaminated stainless steel scissors? (Section 6.4, Para 2)	☐ Yes	☐ No	N/A
4.	If roots were included, was the plant carefully dug from the ground using a garden trowel or shovel and excess dirt shaken off? (Section 6.4, Para 2)	☐ Yes	☐ No	N/A
5.	Were the appropriate tissues placed into uncontaminated, labelled glass jars and maintained in a cooler with Blue Ice or dry ice no longer than 4 hours before being frozen at 20°F or colder? (Section 6.4, Para 2)	☐ Yes	☐ No	N/A
6.	Were the specimens collected for tissue analysis frozen at 20°F or colder until transport to the laboratory? (Section 6.4, Para 2)	☐ Yes	☐ No	N/A

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Comments: Point Intercept Transects #2 & 3 are deviations of protocol, which may have been changed by Document Change Notices, not available to overwatchers

- Field Sampling Plan 2-28-92
- Health and Safety Plan (CH2M Hill 6-15-92) No approval signatures were noted.
- RA Consultants - subcontractor to IT
- CH2M Hill - subcontractor to IT
- Field Instructions for General Operation for OU3 May 20 1992 as HSP. No approval signatures were noted on this document
- All samplers were trained in SARA/SHA 1910.120d
- A Sampling and Analysis Plan was not used (as per Bruce Beinst EG&G Environmental)
- Document Change Notice requires the use of flagging this DCN was not available.
- Tape was stretched, but allowed to settle over vegetation. Document change notice 5.21.205 allows for point sampling at 0.5 m.
- Tape allowed to sag therefore less than 100 m² area available for recording species.
- Production plot data and tissue collection aspects of this SOP were not conducted at this sampling initial.

① SAP in existance, EG&G so advised.

V. FIELD DOCUMENTATION

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Operable Unit No./Station Number(s): OU 3 TSS 11

Sample Number(s): ______

Surveillance Date: ___/___/___ Time: ______

Surveiller(s): ______

1. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1) ☑ Yes ☐ No

2. Were the sample labels and chain of custody forms correctly filled-out? (Section 6.4, Para 3) N/A ☐ Yes ☐ No

3. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:

   (a) Biota Field Sample Form (5.0A) (Section 7.1, Para 1) ☐ Yes ☑ No

   (b) Point-Intercept Transect Data Form (5.10A) (Section 7.2, Para 1) ☑ Yes ☐ No

   (c) Belt Transect Data Form (5.10B) (Section 7.3, Para 1) ☑ Yes ☐ No

   (d) Production Plot Data Form (5.10C) (Section 7.4, Para 1) NA ☐ Yes ☐ No

   (e) Releve Survey Data Form (5.10D) (Section 7.5, Para 1) N/A ☐ Yes ☐ No

   (f) Terrestrial Site Description Form (5.0D) (Section 7.6, Para 1) ☐ Yes ☑ No

Comments: [illegible handwriting]

VI. REFERENCES

1. Standard Operating Procedures, Ecology 5.0

2. Standard Operating Procedures, Field Operations

3. Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities

4. Quality Assurance Addenda (QAA) to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities and Addenda

5. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan and Addenda

EE.10 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF VEGETATION

U.S. Department of Energy, Rocky Flats Plant

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.10, Sampling of Vegetation

VOLUME V ECOLOGY - I. GENERAL INFORMATION

Assessment Date: 06/30/92 Time: 1015

Operable Unit No./Station Number(s): 03 - Walnut Creek Tributary 2

Sampling Team Observer — L. Allin Stephens Jr.

1. Is SOP EE.10 the procedure used by field team? ☑ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Ingrid Hanne	RA Consultants	M.S.	16
Carolyn O'Hare	CH2M Hill	B.S.	7
James Bres	CH2M Hill	B.S.	2

(Sam Bamberg had other responsibilities and left Ingrid in charge of team.)*

2. Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0, Para 1) ☑ Yes ☐ No

Comments: Sam Bamberg, R.A. Consultants is vegetation sampling team leader. He has a PhD and 35 years field experience.

II. SAMPLING EQUIPMENT/MATERIALS

3. Are the equipment/materials inspected and maintained on a regularly scheduled basis? Not applicable (Equipment includes measuring tape and yard sticks) ☐ Yes ☐ No

4. Are records or logs kept identifying:

   ☑ inspection dates? ☑ inspection results?
   ☑ inspector's name? ☑ actions taken?

5. Were the correct types and amounts of equipment/materials taken into the field? ☑ Yes ☐ No

6. Were decontamination procedures and requirements met? Not applicable ☐ Yes ☐ No

7. Were waste management procedures and requirements met? Not applicable ☐ Yes ☐ No

Comments: Comments and answers to questions do not vary from Surveillance I vegetation sampling team on June 29, 1992. Work proceeded in the same manner on June 30 as on June 29. Applicable documents such as HSP, FSP, etc. were not changed with regard to status.

III. HEALTH AND SAFETY

8. Is the most current HSP available for review? ☐ Yes ☒ No

9. Are the H&S guidelines and requirements documented in the HSP? ☑ Yes ☐ No

10. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☒ Yes ☐ No

Comments: 8. The task specific HSP is not completed and approved at this time
9. The contract HSP was being utilized by the sample team however it is not apparently approved.

IV. FIELD SAMPLING ACTIVITIES

Quantitative Community Surveys

Point - Intercept Transects

11.	Were survey transects located and oriented as specified in SAP? (Section 6.2.1, Para 2)	☑ Yes ☑ (1) No
12.	Were 50-m transects (multiple shorter transects that total 50 m) measured with a tape and marked with flagging? (Section 6.2.1, Para 2)	☐ Yes ☑ No
13.	Did the observer walk along the stretched tape and record each plant (by species) intercepted ("hit") by the tape measure at 1-m intervals (i.e., 50 hits per transect)? (Section 6.2.1, Para 2)	☑ (*) Yes ☐ No
14.	If a live plant was not intercepted, did the observer record if the "hit" was litter, rock, or bare soil? (Section 6.2.1, Para 2)	☑ Yes ☐ No

Belt Transects

15.	Were belt transects established 1 m to each side of point-intercept transects for a total of 100 m^2 and located and oriented as specified in SAP? (Section 6.2.2, Para 1)	☐ Yes ☑ No
16.	Did the observer walk along the transect, count, and record each shrub, subshrubs, cacti, and yucca that are more than half contained in within the belt? (Section 6.2.2, Para 1)	☑ Yes ☐ No

Comments:

11. No SAP was available and none has been approved for this specific task. Sampling being performed per FSP.
12. No flagging was used.*
15. Because of way in which less than 100 m^2 was sampled.
13. Only 1st & 2nd hit were recorded. 3rd or other hits not recorded.
*As SOP change notice (not available at site) allows deletion of the flagging

17. Did the observer walk along the transect, count, and record each plant species present within the belt? (Section 6.2.2, Para 1) ☑ Yes ☐ No

Production Plots

18. Were survey transects located and oriented as specified in the SAP? (Section 6.2.3, Para 1) ☐ Yes ☐ No

19. Were 50-m transects (multiple shorter transects that total 50 m) measured with a tape and marked with flagging? (Section 6.2.1, Para 2) ☐ Yes ☐ No

20. Did the observer place the 0.5-m^2 quadrant frame at 10-m intervals along the side of the 50-m tape and record all species present within the quadrant and the sample point ID at each location? (Section 6.2.3, Para 1) ☐ Yes ☐ No

21. Did the observer measure the height of the three tallest individual plants within the quadrant and record by species? (Section 6.2.3, Para 1) ☐ Yes ☐ No

22. Did the observer clip all aboveground, current-year's growth herbaceous species (not woody plants, cacti, or yucca) within the quadrant (canopies of plants with their crowns outside the frame should not be clipped)? (Section 6.2.3, Para 1) ☐ Yes ☐ No

23. Did the observer sort the clipped material by species (for major species) and place each species into properly labelled paper bags? (Note: major species are those species "hit" along the line-intercept transect during the collection of cover data.) (Section 6.2.3, Para 1) ☐ Yes ☐ No

Comments:

18-27 No answers given since no production plots were developed and samples taken. Production sampling to be performed at another time.

24. Did the observer lump minor species by lifeform? (Note: minor species are those species not "hit" along the line-intercept transect during the collection of cover data.) (Section 6.2.3, Para 2) ☐ Yes ☐ No

25. If the FSP specified the clipping of standing biomass, was the biomass clipped and placed in a labelled paper bag at each quadrant location? (Section 6.2.3, Para 1) ☐ Yes ☐ No

26. If the FSP specified the collection of plant litter, was the litter gathered and placed in a labelled paper bag at each quadrant location? (Section 6.2.3, Para 1) ☐ Yes ☐ No

27. Was the clipped material and litter oven dried in the bag (104oC for 24 hours) and the contents of each bag weighed to the nearest 0.1 gram? (Section 6.2.3, Para 2) ☐ Yes ☐ No

Quantitative Community Surveys

28. Was the entire study area traversed and the species recorded along with abiotic data such as substrate, topography, and soil moisture in the field logbook? (Section 6.3.1, Para 2) ☐ Yes ☑ No

Tissue Collection

29. Were the locations, species, tissues (fruits, foliage, roots), and sample sizes specified in the FSP? (Section 6.4, Para 1) ☐ Yes ☒ No

30. Were the specific plants located in accordance with the FSP? (Section 6.4, Para 2) ☐ Yes ☐ No

Comments:

28. Area was traversed & species recorded but not substrate, topography & soil moisture.

29-34 Tissue samples were not collected for analysis. This work is scheduled for another time.

31. Were the appropriate tissues clipped with uncontaminated stainless steel scissors? (Section 6.4, Para 2) ☐ Yes ☐ No

32. If roots were included, was the plant carefully dug from the ground using a garden trowel or shovel and excess dirt shaken off? (Section 6.4, Para 2) ☐ Yes ☐ No

33. Were the appropriate tissues placed into uncontaminated, labeled glass jars and maintained in a cooler with Blue Ice or dry ice no longer than 4 hours before being frozen at 20°F or colder? (Section 6.4, Para 2) ☐ Yes ☐ No

34. Were the specimens collected for tissue analysis frozen at 20°F or colder until transport to the laboratory? (Section 6.4, Para 2) ☐ Yes ☐ No

V. FIELD DOCUMENTATION

35. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1) ☑ Yes ☐ No

36. Were the sample labels and chain of custody forms correctly filled out? (Section 6.4, Para 3) ☐ Yes ☐ No

Comments:

36 Sample labels & chain of custody forms were used since no samples were scheduled to be collected.

① SAP in existence, EGG as advised.

37. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:

a. Biota Field Sample Form (5.0A)? (Section 7.1, Para 1) ☐ Yes ☐ No

b. Point-Intercept Transect Data Form (5.10A)? (Section 7.2, Para 1) ☑ Yes ☐ No

c. Belt Transect Data Form (5.10B)? (Section 7.3, Para 1) ☑ Yes ☐ No

d. Production Plot Data Form (5.10C)? Not applicable (Section 7.4, Para 1) ☐ Yes ☐ No

e. Releve Survey Data Form (5.10D)? Not applicable (Section 7.5, Para 1) ☐ Yes ☐ No

f. Terrestrial Site Description Form (5.0D)? (Section 7.6, Para 1) ☐ Yes ☑ No
Sample team was not observed using form.

Comments:

EE.07 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF BIRDS

U.S. Department of Energy, Rocky Flats Plant

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.07, Sampling of Birds

VOLUME V ECOLOGY - L GENERAL INFORMATION

Assessment Date: 6/30/92 Time: 10:15 am
Surveillor(s) J.A Otten; John Martinsen
Operable Unit No./Station Number(s): OU-3 TSS # 5 (Quantitative)
TSS # 12 (Qualitative)

1. Is SOP EE.07 the procedure used by field team? ☒ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Jill Stoecker	Stoecker Ecological Consultants	MS Physical Anthropology	19

2. Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0 Para 1) ☒ Yes ☐ No

Comments: Although team member did not have a degree in biology, her field experience qualifies her to perform the work.

II. SAMPLING EQUIPMENT/MATERIALS

3. Are the equipment/materials inspected and maintained on a regularly scheduled basis? ☐ Yes ☑ No

4. Are records or logs kept identifying:

   ☐ inspection dates? ☐ inspection results?
   ☐ inspector's name? ☐ actions taken?

5. Were the correct types and amounts of equipment/materials taken into the field? ☐ Yes ☑ No

Comments: 3. Thermometer not available. (only piece of equipment that would require inspection).

4. No records or logs were available.

5. No thermometer, no bound field note book, no waterproff pens, no field data forms (took notes in notebook + transcribed to forms at end of day).

III. HEALTH AND SAFETY

6. Is the most current HSP available for review? ☐ Yes ☑ No

7. Are the H&S guidelines and requirements documented in the HSP? ☐ Yes ☑ No

8. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☐ Yes ☑ No

Comments: 6. Not familiar with HSP (indication was that the Steelers followed RA Consultants HSP).

8. No San/OSHA training. Will take 24 training week of July 6 1992. Allowed to walk around + out training (According to what she was told by Bruce Bevirt).

IV. FIELD SAMPLING ACTIVITIES

Quantitative Songbird Surveys

Sample Plots

9. Were the sample plots located as specified in the sampling and analysis plan (SAP)? (Section 6.2, Para 1) — ☑ Yes ☒ No (1)

10. Were the sample plots measured and the corners marked with nonflourescent flagging tied to vegetation? (Section 6.2.1, Para 2) — ☑ Yes ☐ No

11. Was each sampling site approached slowly, and did the observer stand quietly at the midpoint of the side which provides the best lighting (the sun at the observer's back)? (Section 6.2.1, Para 2) — ☑ Yes ☐ No

12. After standing quietly for one minute, did the observer record:

    a. Singing males by species heard within the plot during a period of four minutes? (Section 6.2.1, Para 2) — ☑ Yes ☐ No

    b. Singing males outside the plot but within approximately 10 m of the edge of the plot? (Section 6.2.1, Para 2) — ☑ Yes ☐ No

    c. Observations of additional species seen within the plot but not heard? (Section 6.2.1, Para 2) — ☑ Yes ☐ No

13. Was the total sampling period divided into two halves and each sample plot survey twice in each half? (Section 6.2.1, Para 3) — ☐ Yes ☒ No (Can't comment)

Comments:

9. There is no SAP.

10. Plots were 100x100. DCN allows this, but DCN was not available to Surveillors.

12. Did not stand quietly for one minute.

13. The 100 x 100 m plot was approached and team member Zig-zagged through the plot. She did do the first minute, but not twice.

14. Was the daily sampling period divided into two halves and each sample plot survey twice in each half? (Section 6.2.1, Para 3) ☐ Yes ☑ No

15. Were all surveys conducted by the same principal observer, or, if two observers were used, did each observer survey each plot twice? (Section 6.2.1, Para 3) ☑ Yes ☐ No

16. Were all surveys conducted during favorable weather between 0600 and 1000 hours MDT (0500 and 0900 hours solar time)? (Section 6.2.1, Para 3) ☐ Yes ☑ No

17. In addition to survey data, were data recorded on temperature, approximate wind speed, and cloud cover at the start and conclusion of a sampling morning? (Section 6.2.1, Para 4) ☐ Yes ☑ No

Spot-Mapping N/A

18. Were the spot-map area limits determined using an aerial photograph or topographic map and located as specified in SAP? (Section 6.2.3, Para 1) ☐ Yes ☐ No

19. Were spot-map area limits marked with non-flourescent flagging tied to vegetation? (Section 6.2.3, Para 1) ☐ Yes ☐ No

20. If the census area included more than one habitat type, were the boundaries of the different habitats located on a aerial photograph or topographic map? (Section 6.2.3, Para 1) ☐ Yes ☐ No

21. Were the census areas sampled on four separate days not more than one week apart (i.e., four weeks total)? (Section 6.2.3, Para 1) ☐ Yes ☐ No

Comments:

14. The 100x100 mm plot was approached and team member zig-zagged through the plot. She did the four quadrats but not twice.

15. Single observer on this date.

16. Favorable weather, survey began at 10:15 am, ended at 10:40 am.

17. No temp. recorded, wind speed and cloud cover recorded when survey was initiated (at conclusion, not at beginning).

22. Did the observer spend one hour walking slowly through each census area recording species by song and approximate singing location, nest locations, and species seen but not heard on the aerial photograph or topographic map? (Section 6.2.3, Para 1) ☐ Yes ☐ No

23. Were all surveys conducted by the same principal observer, or, if two observers were used, did each observer survey each census area? (Section 6.2.1, Para 3) ☐ Yes ☐ No

24. Were all surveys conducted during favorable weather between 0600 and 1000 hours MDT (0500 and 0900 hours solar time)? (Section 6.2.1, Para 3) ☐ Yes ☐ No

25. In addition to survey data, were data recorded on temperature, approximate wind speed, and cloud cover at the start and conclusion of a sampling morning? (Section 6.2.3, Para 2) ☐ Yes ☐ No

Qualitative Songbird Surveys

26. Did surveys consist of the observer traversing the area during favorable weather on at least three occasions during spring or fall? (Section 6.3, Para 1) ☑ Yes ☐ No

27. Did the observer record all species encountered, estimated number, behavior, habitat, and nesting sites in all habitats? (Section 6.3, Para 1) ☐ Yes ☑ No

Comments:

26. First time in area. Team member stated would be done at least 3 times.

27. Recorded raptors, not other species, no behavior recorded, no habitat recorded, no nesting sites recorded (were several nests observed)

V. FIELD DOCUMENTATION

28. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1) ☐ Yes ☑ No

29. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:

a. Songbird Breeding Plot Data Form (5.7A)? (Section 7.1, Para 1) ☐ Yes ☑ No

b. Songbird Belt Transect Data Form (5.7B)? (Section 7.2, Para 1) ☐ Yes ☐ No N/A

c. Bird Nesting Record Form (5.7C)? (Section 7.3, Para 1) ☐ Yes ☐ No N/A

d. Raptor Nest Observation Data Form (5.7D)? (Section 7.4, Para 1) ☐ Yes ☐ No N/A

e. Qualitative Survey/Relative Abundance Data Form (5.0E)? (Section 7.5, Para 1) ☐ Yes ☑ No

f. Terrestrial Site Description Form (5.0D)? (Section 7.6, Para 1) ☐ Yes ☑ No

Comments:

28. Used small spiral notebook for recording shield flow rates would be transferred to forms at end of day).

29 a. Forms not used, see comment 28.

29 e. Forms not used, see comment 28.

29 c. Forms not used, see comment 28.

① SAP in existence, EE&G to advised.

EE.02 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF BENTHIC MACROINVERTEBRATES

U.S. Department of Energy, Rocky Flats Plant

Prepared by: Integrated Computer Systems for the Hazardous Waste Remedial Action Program (HAZWRAP)

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.02, Sampling of Benthic Macroinvertebrates

VOLUME V ECOLOGY - I. GENERAL INFORMATION

Surveillance Date: 7/14/92 Time: 3:00 PM - 5:30 PM

Surveiller(s): L. Allin Stephens, John P. Martinson

Operable Unit No./Station/Transect No.(s): 003 Station 12

Is SOP EE.02 the procedure used by field team? ☒ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Mike Mischuk	CH2M Hill	MS Biology	18
Karmen Klima	CH2M Hill	MS Aquatic Toxicology	5

Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0, Para 1) ☒ Yes ☐ No

Comments:

II. SAMPLING EQUIPMENT/MATERIALS

1. Were the equipment/materials inspected and maintained on a regularly scheduled basis? ☒ Yes ☐ No

2. Were records or logs kept identifying:

   ☒ inspection dates? ☒ inspection results?

   ☒ inspector's name? ☒ actions taken?

3. Were the correct types and amounts of equipment/materials taken into the field? ☑ Yes ☐ No

4. Were decontamination procedures and requirements met? ☑ Yes ☐ No

5. Were waste management procedures and requirements met? ☑ Yes ☐ No

Comments: 2. Temperature calibration logs not in place - crew is obtaining NBS traceable thermometer. Logs in place for turbidity, DO, conductivity and pH meters.

III. HEALTH AND SAFETY

1. Was the most current HSP available for review? ☒ Yes ☐ No

2. Were the H&S guidelines and requirements documented in the HSP? ☒ Yes ☐ No

3. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☑ Yes ☐ No

Comments: Each member of sampling team had 40 hr OSHA 1910.120 training.

IV. FIELD SAMPLING ACTIVITIES

Reference: Sampling of Benthic Macroinvertebrates, Ecology SOP EE.02, February 1991

Operable Unit No./Station Number(s): OU3 Station 12

Surveillance Date: 7 JUL 92 Time: 3:00 - 5:00 PM

Surveiller(s): L. Allin Stephens and John P. Martinson

Sample Location

1.	Were the reach of the stream or sections of the pond to be sampled marked and located as specified in the SAP? (Section 6.2.1, Para 1)	☑ Yes	☐ No	

Sampling Devices

1.	Were Surber, Hess, or invertebrate box samplers that sample 0.1 m^2 with a No. 30 (0.595 mm) mesh used in flowing water, and was an Ekman dredge used in standing water or slow currents over soft substrates? (Section 6.1, Para 1,2)	☐ Yes	☐ No	N/A

Water Quality Parameters

1.	Were temperature, dissolved oxygen, pH, depth, current velocity, turbidity, and conductivity measured at each site? (Section 6.2.5, Para 1)	☑ Yes	☐ No	

Stream Surveys

1.	Did sampling begin at the station farthest downstream and proceed upstream? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
2.	Was the sampler placed flat on the substrate and oriented with the opening of the net facing upstream without disturbing the sediment upstream of the sampler? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
3.	Were rocks or other objects in the sampling area overturned to dislodge organisms? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
4.	Were attached organisms on large objects (>5 cm) dislodged with fingers or a brush or picked off by hand? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
5.	Were dislodged organisms effectively captured in the net? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Benthic Macroinvertebrates, Ecology SOP EE.02, February 1991

6. Was the sampling intensity approximately equal for each station? (Section 6.2.2, Para 2) ☐ Yes ☐ No N/A

7. Was a sediment sample for grain size analysis taken from each location sampled within a site? (Section 6.2.4, Para 1) ☐ Yes ☐ No N/A

Surveys of Ponds or Other Standing Water

1. Were samples located in littoral zones away from depositional areas around inlets? (Section 6.3.1, Para 1) ☑ Yes ☐ No

2. Was the Ekman dredge operated as follows:

   (a) Were the jaws cocked open and the dredge lowered to the bottom? (Section 6.3.2, Para 1) ☑ Yes ☐ No

   (b) With the dredge resting upright on the bottom, were the jaws tripped using the messenger, then was the dredge raised to the surface at a steady rate? (Section 6.3.2, Para 1) ☑ Yes ☐ No

   (c) If jaws were not closed, was the sample discarded, the dredge rinsed in pond or stream water, and the procedure repeated? (Section 6.3.2, Para 1) ☑ Yes ☐ No

   (d) If jaws were closed, was the entire sample released into a clean bucket and the sediment washed from the sample with distilled water? (Section 6.3.2, Para 1) ☑ Yes ☐ No

3. If a hand core was used, was a 20 cm long core obtained and placed in a clean bucket, then processed as above for dredge samples? (Section 6.3.2, Para 2) ☐ Yes ☐ No N/A

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Benthic Macroinvertebrates, Ecology SOP EE.02, February 1991

Tissue Analysis

1.	Were mobile organisms collected using kick seines or dip nets? (Section 6.4, Para 2)	☐ Yes	☐ No N/A
2.	Were the species selected for tissue analysis the same as the species listed for tissue analysis in the SAP? (Section 6.4, Para 1)	☐ Yes	☐ No N/A
3.	Were the specimens collected for tissue analysis placed into uncontaminated containers, labelled, and maintained in a cooler with Blue Ice or dry ice no longer than 4 hours before being frozen at 20°F or colder? (Section 6.4, Para 2)	☐ Yes	☐ No N/A
4.	Were the specimens collected for tissue analysis frozen at 20°F or colder until transport to the laboratory? (Section 6.4, Para 3)	☐ Yes	☐ No N/A

Comments: Water Quality Parameters: 1) current velocity not measured since samples obtained in reservoir. Surveys of Ponds or Other Standing Water: 2) Ponar dredge used.

V. FIELD DOCUMENTATION

Reference: Sampling of Benthic Macroinvertebrates, Ecology SOP EE.02, February 1991

Operable Unit No./Station Number(s): OU3 Station 12

Sample Number(s): NA

Surveillance Date: 7/14/92 Time: 3:00 - 5:00 PM

Surveiller(s): L. Allin Stephens and John P. Martinson

1. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1) ☑ Yes ☐ No

2. Were the sample labels and chain of custody forms correctly filled-out? (Section 6.4, Para 3) Not Observed ☐ Yes ☐ No

3. Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:

   (a) Benthic Macroinvertebrate Field Sample Form (5.2A) (Section 7.1, Para 1) ☐ Yes ☐ No NA

   (b) Stream Habitat Description Form (5.0A) (Section 7.2, Para 1) ☐ Yes ☐ No NA

   (c) Pond Habitat Description Form (5.0B) (Section 7.3, Para 1) ☐ Yes ☒ No

Comments: _____

VI. REFERENCES

1. Standard Operating Procedures, Ecology 5.0

2. Standard Operating Procedures, Field Operations

3. Standard Operating Procedures, Surface Water

4. Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities

5. Quality Assurance Addenda (QAA) to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities and Addenda

6. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan and Addenda

EE.04 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF FISHES

U.S. Department of Energy, Rocky Flats Plant

Prepared by: Integrated Computer Systems for the Hazardous Waste Remedial Action Program (HAZWRAP)

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.04 Sampling of Fishes

VOLUME V ECOLOGY-I. GENERAL INFORMATION

Surveillance Date: 7/14/92 / 7/15/92 Time: 8:30 PM - 10:00 PM / 1:30 PM -

Surveiller(s): L. Allin Stephens and John P Martinson

Operable Unit No./Station Number(s): OU 3 Station 11 / BI017292

Is SOP EE.04 the procedure used by field team? ☒ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Richard Moos	CH2M Hill	Ph.D Zoology	20+
Mike Mischuk	CH2M Hill	MS Biology	18
Karmen Klima	CH2M Hill	MS Aquatic Toxicology	5
Robert Shelden	CH2M Hill	MS Environmental Health	1

Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0, Para 1) ☒ Yes ☐ No

Comments: Fish were collected in the evening of 7-14-92 and processed on 7-15-92 in early afternoon.

II. SAMPLING EQUIPMENT/MATERIALS

1. Are the equipment/materials inspected and maintained on a regularly scheduled basis? ☑ Yes ☐ No

2. Are records or logs kept identifying:

   ☑ Inspection dates? ☑ Inspection results?

   ☑ Inspector's name? ☑ actions taken?

3. Were the correct types and amounts of equipment/materials taken into the field? ☑ Yes ☐ No

4. Were decontamination procedures and requirements met? ☑ Yes ☐ No

5. Were waste management procedures and requirements met? ☑ Yes ☐ No

Comments: 2) Temperature calibration logs not in place. Personnel are in process of obtaining NBS traceable thermometer. Logs in place for turbidity, conductivity, and pH meters

III. HEALTH AND SAFETY

1. Is the most current HSP available for review? ☒ Yes ☐ No

2. Are the H&S guidelines and requirements documented in the HSP? ☒ Yes ☐ No

3. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☒ Yes ☐ No

Comments: All personnel have received 40hr OSHA training 1910.120.

IV. FIELD SAMPLING ACTIVITIES

Reference: Sampling of Fishes, Ecology SOP EE.04, February 1991

Operable Unit No./Station Number(s): OU3 Station 11

Surveillance Date: 7/14/92/7/15/92 Time: 8:30 PM - 10:00 AM / 1:30 PM -

Surveiller(s): L. Allin Stephens and John P. Martinsen

Sample Location

1.	Were the reach of the stream or sections of the pond to be sampled marked and located as specified in the SAP? (Section 6.2.1, Para 1)	☒ Yes	☐ No	

Seining

1.	Were seines of 0.5 cm mesh used in stream reaches? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
2.	Did stream reach seining proceed upstream in 10 m intervals? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
3.	Was the sampling intensity approximately equal for each 10 m stream reach interval? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
4.	Were seines of 0.5 cm or 2 cm mesh used in ponds and lakes? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
5.	Did pond and lake seining proceed in large arcs moving toward the bank? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A
6.	Was the sampling intensity approximately equal for each pond or lake arc? (Section 6.2.2, Para 1)	☐ Yes	☐ No	N/A

Electrofishing

1.	Were backpack units with pulsing DC current and kill switch used? (Section 6.2.3, Para 1)	☐ Yes	☒ No	
2.	Did everyone in the water wear waders and rubber or latex gloves? (Section 6.2.3, Para 1)	☐ Yes	☒ No	
3.	Did electrofishing proceed upstream with at least one person retrieving fish? (Setions 6.2.3, Para 1)	☐ Yes	☒ No	

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Fishes, Ecology SOP EE.04, February 1991

Handling of Samples

1.	Were fish placed in a livewell or equivalent until processing? (Section 6.2.5, Para 1)	☑ Yes	☐ No
2.	Was the species, weight, total length, sex, age, and deformities recorded on Form 5.4B, Fish Field Inventory Form? (Section 6.2.5, Para 1)	☑ Yes	☐ No
3.	Were fish not selected for tissue analysis released? (Section 6.2.5, Para 1)	☑ Yes	☐ No
4.	Were the fish species selected for tissue analysis the same as the species listed for tissue analysis in the SAP? (Section 6.1, Para 1)	☐ Yes	☒ No
5.	Were the specimens collected for tissue analysis placed into uncontaminated, teflon bags or aluminum foil, labelled, and maintained in a cooler with Blue Ice or dry ice no longer than 4 hours before being frozen at 20°F or colder? (Section 6.2.5, Para 1)	☐ Yes	☒ No
6.	Were the specimens collected for tissue analysis frozen at 20°F or colder until transport to the laboratory? (Section 6.2.5, Para 1)	☑ Yes	☐ No

Water Quality Parameters

1.	Were temperature, dissolved oxygen, pH, alkalinity, conductivity, and turbidity measured at each site? (Section 6.2.5, Para 1)	☑ Yes	☐ No

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Fishes, Ecology SOP EE.04, February 1991

Comments: Electrofishing:

1) Properly equipped boat utilized for electrofishing
2) Personnel in the boats retrieving fish with nets wore rubber boots and gloves.
3) Reservoir sampled
Handling of Samples
5) Samples were not frozen within a cooler of Blue Ice or Dry Ice. Regular bag ice used. Samples were refrigerated overnight prior to dissection for organs.
4) Additional species retained for tissue analysis included longnosed sucker and carp, species targeted for collection (FSP Table 8-8) were not encountered (except minnows).

V. FIELD DOCUMENTATION

Reference: Sampling of Fishes, Ecology SOP EE.04, February 1991

Operable Unit No./Station Number(s): OU3 Station 11

Sample Number(s): BIO 3710 CH Composite of 2 sucker fish (whole bodies) BIO 3711 CH (composite liver from 2 carp) BIO 3712 CH (composite kidney from 2 carp

Surveillance Date: 7/14/92 Time: 8:30 AM

Surveiller(s): L. Allin Stephens

1.	Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1)		☐ Yes	☐ No
2.	Were the sample labels and chain of custody forms correctly filled-out? (Section 6.2.5, Para 3)		☑ Yes	☐ No
3.	Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:			
	(a) Fish Field Sample Form (5.4A) (Section 7.1, Para 1)		☐ Yes	☐ No
	(b) Fish Field Inventory Form (5.4B) (Section 7.2, Para 1)		☑ Yes	☐ No
	(c) Stream Habitat Description Form (5.0A) (Section 7.3, Para 1)	N/A	☐ Yes	☐ No
	(d) Pond Habitat Description Form (5.0B) (Section 7.4, Para 1)		☐ Yes	☐ No

Comments:

Sample #'s (cont.) BIO3713 - whole body carp w/o entrails
BIO3714 - whole body carp w/o entrails

VI. REFERENCES

1. Standard Operating Procedures, Ecology 5.0

2. Standard Operating Procedures, Field Operations

3. Standard Operating Procedures, Surface Water

4. Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities

5. Quality Assurance Addenda (QAA) to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities and Addenda

6. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan and Addenda

EE.10 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF VEGETATION

U.S. Department of Energy, Rocky Flats Plant

Prepared by: Integrated Computer Systems for the Hazardous Waste Remedial Action Program (HAZWRAP)

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.10 Sampling of Vegetation

VOLUME V ECOLOGY-I. GENERAL INFORMATION

Surveillance Date: 7/15/92 Time: 8:00 AM - 8:15 AM

Surveiller(s): L. Allin Stephens and John P. Martinson

Operable Unit No./Station Number(s): OU3 Station 7

Is SOP EE.10 the procedure used by field team? ☑ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Ingrid Hanne	RA Consultants	MS	16
Carolyn O'Hare	CH2M Hill	BS	1
Tamar Ares	CH2M Hill	BS	2
Sam Bambero	RA Consultants	Ph D	35

Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0, Para 1) ☑ Yes ☐ No

Comments: _____

II. SAMPLING EQUIPMENT/MATERIALS

1. Are the equipment/materials inspected and maintained on a regularly scheduled basis? ☐ Yes ☐ No N/A

2. Are records or logs kept identifying:

   ☐ inspection dates? ☐ inspection results? N/A

   ☐ inspector's name? ☐ actions taken?

3. Were the correct types and amounts of equipment/materials taken into the field? ☑ Yes ☐ No

4. Were decontamination procedures and requirements met? ☑ Yes ☐ No

5. Were waste management procedures and requirements met? ☑ Yes ☐ No

Comments: _____

III. HEALTH AND SAFETY

1. Is the most current HSP available for review? ☑ Yes ☐ No

2. Are the H&S guidelines and requirements documented in the HSP? ☑ Yes ☐ No

3. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☑ Yes ☐ No

Comments: All personnel have received 40 hr OSHA training 1910.120.

IV. FIELD SAMPLING ACTIVITIES

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Operable Unit No./Station Number(s): OU3 Station 7

Surveillance Date: 7/15/92 Time: 8:00 - 8:15AM

Surveiller(s): L. Allin Stephens and John P. Martinson

Quantitative Community Surveys

Point - Intercept Transects

1.	Were survey transects located and oriented as specified in SAP? (Section 6.2.1, Para 2)	☐ Yes	☐ No	NA
2.	Were 50 m transects (multiple shorter transects that total 50 m) measured with a tape and marked with flagging? (Section 6.2.1, Para 2)	☐ Yes	☐ No	NA
3.	Did the observer walk along the stretched tape and record each plant (by species) intercepted ("hit") by the tape measure at 1 m intervals (i.e., 50 hits per transect)? (Section 6.2.1, Para 2)	☐ Yes	☐ No	NA
4.	If a live plant was not intercepted, did the observer record if the "hit" was litter, rock, or bare soil? (Section 6.2.1, Para 2)	☐ Yes	☐ No	NA

Belt Transects

1.	Were belt transects established 1 m to each side of point-intercept transects for a total of 100 m^2 and located and oriented as specified in SAP? (Section 6.2.2, Para 1)	☐ Yes	☐ No	NA
2.	Did the observer walk along the transect, count, and record each shrub, subshrubs, cacti, and yucca that are more than half contained in within the belt? (Section 6.2.2, Para 1)	☐ Yes	☐ No	NA
3.	Did the observer walk along the transect, count, and record each plant species present within the belt? (Section 6.2.2, Para 1)	☐ Yes	☐ No	NA

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Production Plots

1.	Were survey transects located and oriented as specified in SAP? (Section 6.2.3, Para 1)	☑ Yes	☐ No	
2.	Were 50 m transects (multiple shorter transects that total 50 m) measured with a tape and marked with flagging? (Section 6.2.1, Para 2)	☐ Yes	☑ No	
3.	Did the observer place the 0.5 m^2 quadrant frame at 10 m intervals along the side of the 50 m tape and record all species present within the quadrant and the sample point ID at each location? (Section 6.2.3, Para 1)	☐ Yes	☑ No	
4.	Did the observer measure the height of the three tallest individual plants within the quadrant and record by species? (Section 6.2.3, Para 1)	☑ Yes	☐ No	
5.	Did the observer clip all above-ground, current years growth herbaceous species (not woody plants, cacti, or yucca) within the quadrant (canopies of plants with their crowns outside the frame should not be clipped)? (Section 6.2.3, Para 1)	☑ Yes	☐ No	
6.	Did the observer sort the clipped material by species (for major species) and place each species into properly labelled paper bags? (Section 6.2.3, Para 1) (Note: major species are those species "hit" along the line-intercept transect during the collection of cover data.)	☐ Yes	☐ No	NA
7.	Did the observer lump minor species by lifeform? (Section 6.2.3, Para 2) (Note: minor species are those species not "hit" along the line-intercept transect during the collection of cover data.)	☐ Yes	☐ No	N/A
8.	If the FSP specified the clipping of standing biomass, was the biomass clipped and placed in a labelled paper bag at each quadrant location? (Section 6.2.3, Para 1)	☑ Yes	☐ No	

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

9.	If the FSP specified the collection of plant litter, was the litter gathered and placed in a labelled paper bag at each quadrant location? (Section 6.2.3, Para 1)	☑ Yes	☐ No	
10.	Was the clipped material and litter oven dried in the bag (104° C for 24 hours) and the contents of each bag weighed to the nearest 0.1 gram? (Section 6.2.3, Para 2)	not observed ☐ Yes	☐ No	NA

Quantitative Community Surveys

1.	Was the entire study area traversed and the species recorded along with abiotic data such as substrate, topography, and soil moisture in the field logbook? (Section 6.3.1, Para 2)	☐ Yes	☐ No	NA

Tissue Collection

1.	Were the locations, species, tissues (fruits, foliage, roots), and sample sizes specified in the FSP? (Section 6.4, Para 1)	☑ Yes	☐ No	
2.	Were the specific plants located in accordance with the FSP? (Section 6.4, Para 2)	☑ Yes	☐ No	
3.	Were the appropriate tissues clipped with uncontaminated stainless steel scissors? (Section 6.4, Para 2)	☑ Yes	☐ No	
4.	If roots were included, was the plant carefully dug from the ground using a garden trowel or shovel and excess dirt shaken off? (Section 6.4, Para 2)	☐ Yes	☐ No	NA
5.	Were the appropriate tissues placed into uncontaminated, labelled glass jars and maintained in a cooler with Blue Ice or dry ice no longer than 4 hours before being frozen at 20°F or colder? (Section 6.4, Para 2)	☐ Yes	☑ No	
6.	Were the specimens collected for tissue analysis frozen at 20°F or colder until transport to the laboratory? (Section 6.4, Para 2)	☐ Yes	☑ No	

IV. FIELD SAMPLING ACTIVITIES (cont.)

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Comments: Production Plot Sampling

Tissue Collection: collection of tissues used for biomass determinations. Extent of assessment precluded observation of drying plant material.

5) Tissue samples placed in labeled paper bags.

6) Tissue samples to be dried and weighed for estimation of biomass at station colocated w/ soil sampling.

Production Plots

#2 and 3) Samples obtained at location of soil sampling - not along 50 m transect.

V. FIELD DOCUMENTATION

Reference: Sampling of Vegetation, Ecology SOP EE.10, February 1991

Operable Unit No./Station Number(s): OU3 Station 7

Sample Number(s): _____

Surveillance Date: 7/15/92 Time: 8:15

Surveiller(s): L. Allin Stephens and John P. Martinson

1.	Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1)	not observed ☐ Yes	☐ No	
2.	Were the sample labels and chain of custody forms correctly filled-out? (Section 6.4, Para 3)	not observed ☐ Yes	☐ No	
3.	Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:			
	(a) Biota Field Sample Form (5.0A) (Section 7.1, Para 1)	☐ Yes	☐ No	
	(b) Point-Intercept Transect Data Form (5.10A) (Section 7.2, Para 1)	☐ Yes	☐ No	NA
	(c) Belt Transect Data Form (5.10B) (Section 7.3, Para 1)	☐ Yes	☐ No	NA
	(d) Production Plot Data Form (5.10C) (Section 7.4, Para 1)	☑ Yes	☐ No	
	(e) Releve Survey Data Form (5.10D) (Section 7.5, Para 1)	☐ Yes	☐ No	NA
	(f) Terrestrial Site Description Form (5.0D) (Section 7.6, Para 1)	☐ Yes	☒ No	

Comments: _____

VI. REFERENCES

1. Standard Operating Procedures, Ecology 5.0

2. Standard Operating Procedures, Field Operations

3. Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities

4. Quality Assurance Addenda (QAA) to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities and Addenda

5. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan and Addenda

EE.06 - FIELD SURVEILLANCE CHECKLIST FOR SAMPLING OF SMALL MAMMALS

U.S. Department of Energy, Rocky Flats Plant

Prepared by: Integrated Computer Systems for the
Hazardous Waste Remedial Action Program (HAZWRAP)

Reference: EMD Operating Procedures Manual No. 5-21200-OPS-EE
EE.06 Sampling of Small Mammals

VOLUME V ECOLOGY-I. GENERAL INFORMATION

Surveillance Date: 7/15/92 Time: 8:15AM-9:30AM 6:00-6:10PM

Surveiller(s): L. Allin Stephens and John P. Martinson

Operable Unit No./Station Number(s): OU 3 Station 7, 6, 5 and 8

Is SOP EE.06 the procedure used by field team? ☑ Yes ☐ No

If not, is EG&G approved alternate procedure being used? ☐ Yes ☐ No

Field Sampling Team Members

Name	Affiliation	Education	Yrs. Field Exp.
Bob Stoecker	Stoecker Ecological Consultant Inc.	Ph.D. Biology	23
Jill Stoecker	Stoecker Ecological Consultant Inc.	MS Physical Anthropology	19

Do the field sampling team members meet the guidelines for education and field experience? (Section 3.0, Para 1) ☑ Yes ☐ No

Comments: Checking traps of Stations 5-8 observed in AM
Baiting and re-setting traps for Station 7 observed in PM

II. SAMPLING EQUIPMENT/MATERIALS

1. Are the equipment/materials inspected and maintained on a regularly scheduled basis? ☑ Yes ☐ No

2. Are records or logs kept identifying: NA

   ☐ inspection dates? ☐ inspection results?

   ☐ inspector's name? ☐ actions taken?

3. Were the correct types and amounts of equipment/materials taken into the field? ☑ Yes ☐ No

4. Were decontamination procedures and requirements met? ☑ Yes ☐ No

5. Were waste management procedures and requirements met? ☑ Yes ☐ No

Comments: 4). gloves rinsed between sites

III. HEALTH AND SAFETY

1. Is the most current HSP available for review? ☑ Yes ☐ No

2. Are the H&S guidelines and requirements documented in the HSP? ☑ Yes ☐ No

3. Did the H&S actions taken during the field sampling activities meet the applicable requirements and guidelines? ☑ Yes ☐ No

Comments: Personnel have received 40 hr CSHA training 1910.120.

IV. FIELD SAMPLING ACTIVITIES

Reference: Sampling of Small Mammals, Ecology SOP EE.06, February 1991

Operable Unit No./Station Number(s): OU3 Station 7

Surveillance Date: 7/15/92 Time: 6:00 - 6:10

Surveiller(s): John P. Martinson

Baiting and Setting the Traps (Reference SOP)

1.	Were survey transects and stations located as specified in SAP? (Section 6.2.1, Para 2,3)	☑ Yes	☐ No
2.	Were the traps oriented on line parallel to the axis of the grid with the trap ("front") doors facing the same direction (and away from the west)? (Section 6.2.2, Para 1)	☑ Yes	☐ No
3.	Was any debris that could interfere with the trap mechanism removed? (Section 6.2.2, Para 1)	☑ Yes	☐ No
4.	Was the bait consisting of peanut butter and rolled oats or commeal placed on the "back door" of each trap? (Sectiion 6.2.2, Para 1)	☐ Yes	☑ No
5.	Did each trap include polyester bedding material? (Section 6.2.2, Para 1)	☐ Yes	☑ No
6.	Was the treadle adjusted so that the trap shuts upon being gently tapped? (Section 6.2.2, Para 1)	☑ Yes	☐ No
7.	Were the traps targeted at nocturnal species set at least one-half hour before sunset, but not more than 3 hours before sunset? (Section 6.2.2, Para 2)	☑ Yes	☐ No
8.	Were the traps targeted at diurnal species set at least one-half hour after sunrise? (Section 6.2.2, Para 2)	☐ Yes	☐ No NA

IV. FIELD ACTIVITIES (cont.)

Reference: Sampling of Small Mammals, Ecology SOP EE.06, February 1991

Checking and Re-Setting the Traps

1.	Was trap checking begun at least one-half hour after sunrise and finished within four hours of sunrise? (Section 6.2.3, Para 1)	☑ Yes ☐ No
2.	Was the treadle adjusted on "robbed" traps? (Section 6.2.3, Para 1)	☐ Yes ☐ No NA
3.	If the trap contained an animal, was the animal gently placed in a clear plastic bag with adequate air and the trap cleaned, closed, or re-baited and re-set if diurnal species are being sought? (Section 6.2.3, Para 1)	☑ Yes ☐ No
4.	If the trap did not contain an animal, was the treadle adjustment checked? (Section 6.2.3, Para 1)	☐ Yes ☒ No
5.	In live trapping diurnal species, were the traps set in the morning, checked at mid-day and reset, checked again during the late afternoon, and then closed overnight or re-set for nocturnal species? (Section 6.2.3, Para 2)	☐ Yes ☒ No NA

Weighing, Inspecting, and Marking Animals

1.	Was the animal identified to genus, weighed, and sex and age determined? (Section 6.2.4, Para 1)	☑ Yes ☐ No
2.	Was the animal examined for reproductive status, condition of pelage, and presence of tumors or ectoparasites? (Section 6.2.4, Para 1)	☑ Yes ☐ No
3.	If species could not be identified in the field, was the animal measured and described in the field notebook? (Section 6.2.4, Para 1)	☐ Yes ☐ No NA
4.	Was the animal marked with a pelage dye of a different color for each day? (Section 6.2.4, Para 2)	☐ Yes ☒ No

IV. FIELD ACTIVITIES (cont.)

Reference: Sampling of Small Mammals, Ecology SOP EE.06, February 1991

Tissue Collection

1.	Were only adult males and non-lactating females of the species identified in the SAP selected for tissue analysis? (Section 6.3, Para 1)	☐ Yes	☐ No
2.	Were the animals selected for tissue analysis sacrificed by placing them in a sealed container with cotton saturated with Metafane? (Section 6.3, Para 1)	☐ Yes	☐ No
3.	Were the specimens collected for tissue analysis placed into uncontaminated, labelled glass jars and maintained in a cooler with Blue Ice or dry ice no longer than 4 hours before being frozen at 20°F or colder? (Section 6.3, Para 1)	☐ Yes	☐ No
4.	Were the specimens collected for tissue analysis frozen at 20°F or colder until transport to the laboratory? (Section 6.3, Para 2)	☐ Yes	☐ No

Comments: Checking and re-setting traps:
4. To be performed in PM when trap is set.
5. Nocturnal species only.
Weighing, Inspecting, and Marking Animals
4. Hair clipping used to identify recaptures
Baiting and setting traps:
4. Oats only served as bait.
5. Polyester bedding material not added to traps

V. FIELD DOCUMENTATION

Reference: Sampling of Small Mammals, Ecology SOP EE.06, February 1991

Operable Unit No./Station Number(s): OU3 Station 5, 6, 7 and 8

Sample Number(s): _____

Surveillance Date: 7/15/92 Time: 8:15 - 9:30 AM

Surveiller(s): L. Allin Stephens and John P. Martinson

1.	Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded in the field notebook? (Section 7.0, Para 1)	☑ Yes	☐ No	
2.	Were the sample labels and chain of custody forms correctly filled-out? (Section 6.3, Para 2)	☐ Yes	☐ No	NA
3.	Were observations and quantitative data collected during the implementation of these sampling procedures correctly recorded on the following forms:			
	(a) Small Mammal Field Sample Form (5.6A) (Section 7.1, Para 1)	☐ Yes	☐ No	NA
	(b) Small Mammal Live-Trapping Data Form (5.6B) (Section 7.2, Para 1)	☐ Yes	☑ No	
	(b) Quantitative Survey/Relative Abundance Form (5.0C) (Section 7.3, Para 1)	☐ Yes	☐ No	NA
	(c) Terrestrial Site Characterization Form (5.0D) (Section 7.4, Para 1)	☐ Yes	☐ No	NA

Comments: 3b. Draft EE.6A used (Small Mammal Live-Trapping Data Form)

VI. REFERENCES

1. Standard Operating Procedures, Ecology 5.0

2. Standard Operating Procedures, Field Operations

3. Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities

4. Quality Assurance Addenda (QAA) to the Rocky Flats Plant Site-Wide QA Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities and Addenda

5. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan and Addenda